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Editorial Notes

The Re-Assembly of Parliament

THE introduction of contentious domestic legislation is unlikely during the present session of Parliament, when the attention of the nation will still be so closely focused on foreign affairs, with their inevitable repercussions on home affairs.

Among the most pressing of these, by general consent, is the perfecting of air raid precautions. The Gas Industry is prepared, with other industries, to make every possible arrangement for the safety of its workers. There are, however, further requirements with which public utilities are prepared to comply, and in respect of which Governmental assistance has been promised. The amount of such assistance is based upon the actual expenditure which will be involved. Having, therefore, undertaken work on the basis of an agreed rate of Government assistance, it is not unnatural that undertakings should require some assurance that their income-tax liability will not be increased thereby. It is hoped that some statement may be forthcoming from the Government on this matter. It cannot be intended that public utilities should put work on hand in consideration of a certain amount of Government aid and then be left to determine by means of costly litigation whether the Government grant is to be reduced by additional income-tax demands. Suitable provisions have already been enacted in order to ensure that rateable values are not increased by air raid precautions work, and it should not be impossible to devise some means whereby the position of public utility undertakers as income-tax payers is similarly safeguarded.

Turning to matters of perhaps less importance, it is probable that the Report of the Departmental Committee on Valuation for Rates will shortly be in the hands of the Government. Legislation will doubtless be required to implement the findings of the Committee, and such legislation would afford a unique opportunity for remedying the widely admitted grievances of public utilities with regard to rating procedure. The labour and inconvenience, to say nothing of the expense, involved in the assessment of gas undertakings need not be emphasized, and it is essential that there should be some assurance that in ordinary circumstances the assessment obtained as the result of so much labour and expenditure should remain for the full quinquennial period.

Whether the efforts of the Railway Companies to procure a "square deal" will result in immediate legislation is still a matter of some uncertainty, but if any proposals are placed before Parliament the Industry, while in no way unfriendly to the Railway Companies, whose prosperity is so essential to the national interest, must ensure that the desire to regain the lighter traffics does not involve the imposition of additional burdens upon traffic which by its very nature cannot leave the rails.

In the sphere of private legislation, the attention of the Industry will no doubt be focused upon the London Gas Undertakings (Regulations) Bill which is being promoted by the London Gas Companies. The main objects of the Bill have already been summarized in the "JOURNAL," and the Industry will await with interest the decision of Parliament with regard to the application of a somewhat new principle to the distribution of gas in London.

Finally, the question of the relations between highway authorities and public utility undertakers with regard to mains and cables in highways will be considered by a Joint Committee of both Houses of Parliament. The principal question is whether the expense of removing mains where such removal is rendered reasonably necessary by highway reconstruction is to be paid by the public utility or by the highway authority. In other words, is the expense of work which is ancillary to highway reconstruction to fall upon the taxpayers and ratepayers of the country or upon the consumers of those commodities without which life under modern conditions would be impossible?

It may be that in the next few months Parliament will be called upon to make decisions of the utmost importance to the welfare of the Industry, and the matters to which we have referred above, as well as many others, will demand the most careful consideration of our Central Organizations.

Maintenance of Appliances

WE conclude in our issue to-day publication of the Paper which Mr. Leopold Friedman gave a little while ago to the Western Junior Gas Association. The title of the Paper was "District Conditions in Relation to the Maintenance of Gas-Fired Hot Water Appliances," and it was a very interesting contribution on a very important aspect of gas service. "Gas never fails." This is not so much of a Gas Industry slogan as a Gas Industry conviction. In reliability of service, heat on tap, the Industry holds honours in every suit. In production

it has unrivalled flexibility; in storage it has an asset the envy of competitors; in distribution it has wide capacity; in utilizaton, convenience coupled with economy. With skilful play, these surely are good cards, winning cards.

Of course, skilful play is needed. We should imagine that the batswing burner, using sperms instead of therms, required a minimum of "maintenance." The days of candle-power are, however, long since past. To-day, "Gas never fails" demands a new technique, quite a different conception of service from that which obtained, let us say, ten years ago.

In any industry automaticity spells a measure of complexity. There are little gadgets here, little gadgets there, to increase the housewife's comfort, and also to add to "maintenance" problems. At one time we used a "black" cooker —actually it was relieved in front by white—and over several years it gave no trouble whatever. The results of its use depended on the skill of the cook. We had to strike matches to light hotplate and oven burners. We recall no profound despair about this "work."

Which is not to say that we have not marched with the times. We now have "totally enclosed" dinners, a boon and a blessing, thanks to the thermostat—oven control which knew its origin in the "Regulo." Thermostatic control, however, has had its troubles, and on occasion we have had to ring-up a "gas man" to remove a spot of gum from a valve seating.

"Heat on tap." We can now turn-on our hotplate burners, and they ignite—and they do not light-back. We have every convenience. Our fires—they are gas fires—need no match. And about this Mr. Friedman had a little anecdote. We think it amusing. A lady who resides in the Metropolis went to the nearest gas showroom. She said she had been chilled to the marrow all through Christmas. Why? Because the automatic lighter on her gas fire simply would not work.

It is an "automatic" age, and with it are difficulties, but there is nothing alarming about them. Let us take a look at the water heating load. Here we have the slogan "Hot water on tap." This has been made possible by an improved gas supply and the ingenuity and enterprise of the gas appliance manufacturers.

Automatic Hot Water Service

Hot water on tap by gas! Only a turn of a tap. Much work and much thought have made it possible. This advance means a measure of "maintenance." We must look after our appliances. If we looked around we should find not a few broken gas fire radiants in the homes of this country. As yet we have not gone far enough with "maintenance."

We give hot water service on tap. This service means "maintenance." We have an unparalleled hot water service to offer. Automaticity demands care. This care does not involve great cost; of that we are certain. Maintenance of any gas load is worth while. Maintenance of the gas water heating load, as shown by Mr. Friedman, is cheap. If one or two of his precepts are followed, it will not be a question of holding, but of extending, gas business. We are on the fringe only of the water heating load, and electrical competition daily becomes more intense. In the instantaneous water heater the Gas Industry has an appliance and a service which the electrical industry cannot counter. The water heating field which lies before gas is vast and remunerative. Instantaneous gas water heating appliances are available which are well designed and soundly constructed and which are foolproof provided they are properly looked after. The water heating load demands a special technique, specialized training; but this technique can readily be acquired, and the appliance manufacturers are prepared to assist in the necessary training. The maintenance of gas water heaters in first-class working order involves some expense, but not heavy expense. What is needed is some scheme of regular inspection—say, twice a year. If this is adhered to, it will be found that complaints between visits will be very rare, and such special complaints can best be dealt with, we suggest, as being outside the regular maintenance scheme.

Gas appliances are unlike electrical appliances. The troubles with the latter make themselves felt at once. The breaking of an element, for example, immediately renders the appliance useless. With gas appliances, on the other hand, trouble may build itself up gradually and without its being apparent to the consumer. We have in mind the corrosion caused by the products of combustion gradually building up deposits which adversely affect the performance of gas appliances. Regular maintenance would obviate difficulties from this cause. The appliance manufacturers have done and are doing all they can to produce equipment which, while satisfying the modern demand for fully automatic service at low cost, requires a minimum of maintenance. It should be the aim of the Gas Industry to back-up these efforts by supplying gas of a high and constant quality and as free from sulphur as is possible. In his Paper Mr. Friedman was just a little optimistic when he suggested that "while the major portion of the sulphur is removed at the gas-works, there still remains about 8 grains per 100 cu.ft. of gas." If only this was general—which it by no means is—there would be far fewer complaints of the working of gas water heaters, and of other gas consuming appliances. However, there is in this regard cause for satisfaction in the growing adoption of benzole extraction at gas-works, for benzole recovery means a reduction in the sulphur compounds of the final gas distributed.

On the organization of a maintenance scheme Mr. Friedman had many useful suggestions to make; these suggestions undoubtedly merit close consideration. He showed how, by careful planning, the cost of maintaining gas hot water appliances in first-class condition can be kept at a modest figure and the continued satisfaction of the consumer assured. The practical information which the Author imparted will prove of great value and his Paper should encourage gas undertakings to make sure that all is well with their schemes of maintenance and that they are consolidating the gas water heating load in face of all competition.

The Importance of Particle Size

Particle size is a subject of no little importance in many industries and perhaps particularly so in the fuel industries. In powdered coal firing it reaches its apparent peak of importance, and this is due primarily to the fine state of subdivision of the fuel which essentially converts coal into the simulation of a gas. Coal interests may not like the competition of gas, but they acknowledge by their actions in promoting powdered fuel firing that the nearer they can get to the conditions of gaseous combustion, the more useful is solid fuel. The finer the state of sub-division, the greater is the surface and thus the more rapid is the chemical reaction between air and fuel. Similarly, it is becoming the practice in the fuel industries to blend coke dust with coal before carbonization. This practice improves the quality of the resulting coke, as has been abundantly shown by the work of the

various coke research associations, provided that the right type of coal is used; some coals are too near the coking border-line to permit of admixture, but these constitute the minority. It has now been found that the rate of carbonization is increased by blending the coke breeze with the coal, so that the throughput from the retort is increased, or at the worst not diminished, and the dust coke is converted into valuable lump coke at small fuel cost. It is essential that the coke dust shall be added in the form of a fine powder if useful results are to be secured.

In contradistinction to these two instances where fineness of subdivision is sought, we have other instances where fineness is deleterious. Coke immediately springs to mind in this connexion. Coke is the half-way house between coal and gas; like gas it is smokeless, but like coal it gives rise to a certain amount of dirt in handling It is the object of coke producers to eliminate this disadvantage, and in doing so they are concerned almost wholly with particle size. In the vertical retort the action of steam and of abrasion gives rise to a small quantity of very fine flour dust which is readily airborne when dry. Efforts are now being made to eliminate this material at the source, and thus to prevent cokes from giving rise to coke dust nuisance. The debreezing screens at the hopper outlets are sufficient to remove the dust formed on handling, which is not in general so finely divided as that formed in the retorts.

A further difficulty due to fine subdivision is in the ash formed when coke is burned. It can be calculated that if a piece of coke of, let us say, 50 mesh and containing 10% of ash is burned and if the ash from this particle were to fuse into a solid lump, the resulting ash particle would pass through a 150 mesh; whatever the size of the initial piece of coke, the ash resulting therefrom on the foregoing hypothesis would be 1/30 of the volume (the ash being thrice the density of the initial piece of coke) and would be approximately one-third of the linear grain size. The action of burning small coke, therefore, gives rise to particles which are readily airborne. It happens, moreover, that the ash in each particle of coke does not coalesce to form one particle of ash, but that the fine subdivision of the ash causes each particular particle to remain separate unless there is some reason—such as low fusion point or high temperature—for coalescence.

Screening Problems

ALL this leads to the importance of particle size in the Gas Industry and of its determination. An extensive Paper upon this subject has lately been submitted to the Institution of Mechanical Engineers by Dr. Harold Heywood in which this subject is dealt with on general lines. He points out that most industries have particle-size problems, and that the magnitude of these industries can be assessed by considering that no less than 6,000,000 tons of powdered coal, 5,000,000 tons of Portland cement, besides vast quantities of moulding sands, pigments, metallic ores, and so forth are dependent on this property of fine particle subdivision. In general, sieving is the most convenient method of determining particle size down to 200 linear meshes to the inch, or even to 400 meshes in certain circumstances. The difficulty in sieving lies in the fact that it is never possible to achieve complete finality; anyone who has attempted to sieve powdered coal or coke must have been struck by the fact that however long the operation is continued, it always seems possible to extract a little more. This appears to be because the operation resolves itself into two processes. In one of these, the finest material, which readily passes through the screen, is eliminated at constant rate; presumably it would in time be possible to achieve finality in regard to this type of material. In the second operation, which to some extent proceeds simultaneously with the first, the material which is very nearly equal in size to the mesh of the screen is eliminated—the so-called "near-mesh" material. These particles will only pass through the screen when presented in a favourable position. The two stages can be seen clearly by plotting the reciprocal of the rate at which material passes through the sieve against the time of sieving; a straight line can with sufficient accuracy be drawn through the important part of the second stage.

To overcome the difficulty of lack of finality in screening, three methods have been proposed. One of these, which is applicable where a constant type of material is being treated from day to day, is to arrange for a constant time of screening, obviously with a constant machine-method of shaking. Others of more general applicability are to continue sieving until the weight of material passing through the screen per minute is not more than 0·1% of the initial weight taken, or until it is a given percentage of the residue remaining on the screen.

Although testing screens have always square meshes, it is an interesting practical point that Dr. Heywood finds that an increase in the rate of screening of the order of 25% may be secured by using round holes. Perhaps this is a practical point which designers of coke screens may take into account, though it will, of course, affect the coke sizes as sold.

Elutriation

THE screen method of size analysis affects the advantageous features of fine particle size; the disadvantageous features so far as the Gas Industry is concerned are principally related to the possibility of floating the particles in light air-currents. These particles will generally be of the size known as "sub-sieve," and thus the methods in use for these very small particles will be of particular importance. For the most part these consist of elutriation in a current of water or air, or in sedimentation by sinking through a liquid, the rate of settling being noted. The terminal velocity of a particle is affected by its size, shape, and density, and by the density, viscosity, and motion of the surrounding medium, and in particular by whether the motion of the medium round the particles is stream-line or turbulent. The velocity of small particles falling in a fluid having stream-line motion is proportional to the square of the size; as the size of the particles is increased, the motion of the fluid becomes turbulent, which causes an increase in the resistance, and the resulting velocity of fall is less than that calculated by Stokes' law. With a fully turbulent motion, the velocity of fall is proportional to the square root of the size of the particle.

For coal and coke particles, the elutriation method is not suitable unless air is used as the medium; the density of water is too near that of the material. Considering that the problems of particle size under present consideration are closely related to air-flow it would seem especially desirable that this method should be used. Dr. Heywood confirms this view, and remarks that it is especially so for such materials as flue dust consisting of particles having a wide range of density, which causes considerable difference between the results of elutriation by air and by water; the major difficulties to be overcome are those of breaking up the aggregates of particles or of preventing the finer particles from adhering to the sides of the vessel. Whatever the precise method used, the principle is to blow the powder in a tube with a known velocity

of air current until equilibrium has been attained and to weigh the residue of coarse particles which are retained in the apparatus.

Dr. Heywood's Paper contained a great amount of information upon a subject of importance, and here we have only touched upon some of the features which seem of particular interest to the Gas Industry.

Making a Gas Service Record

In our issue to-day Mrs. Eileen Murphy gives a most interesting account of the way in which the Tottenham and District Gas Company is making a complete gas service record of a large district in North London. When the work is finished the collected data will be used for determining sales and service policy. For the scheme trained canvassers are employed, and Mrs. Murphy's story follows upon a week's work as a member of this team of canvassers. Each canvasser makes an average of fifteen calls a day, filling in a service record card for each consumer. The customer is warned by a personal letter of the impending visit of the Company's representative, and, so far, in the course of 14,000 calls the canvassers have only been refused admission at six houses. It is anticipated that the survey, covering more than 25,000 consumers, will take about seven months to complete. The records will make it easy for the Company to give speedy and efficient service in case of complaint, and they will be most valuable as a basis for systematic selling and advertising campaigns in the future.

Personal

The Gas Committee of the Carlisle City Council have appointed Mr. J. G. AITKEN, Deputy Engineer and Manager to the Gas Department, to succeed Mr. J. E. Blundell, who is retiring after 20 years' service at Carlisle.

Mr. Aitken was educated at Leven Public School and Kirkcaldy High School. For two years he attended day classes in general engineering at Heriot Watt College, Edinburgh, and for two years attended night classes in general and electrical engineering. He afterwards studied higher grade gas engineering and manufacture. For the past nine years he has been employed at the Carlisle Corporation Gas-Works—seven years as Technical Assistant and two years as Deputy Engineer and Manager. Before going to Carlisle he had considerable experience as technical assistant with Messrs. West's Gas Improvement Company, Ltd., Manchester. During his association with this firm he was engaged in starting up and operating Glover-West vertical retorts at Belfast, Dublin, Plymouth, Leicester, Nottingham, London, and other centres. During the time he has been connected with the Carlisle undertaking the make of gas has increased from 600 million to 700 million cu.ft. per annum.

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The Directors of the Newcastle-upon-Tyne and Gateshead Gas Company have elected Sir CECIL A. COCHRANE, D.C.L., Chairman of the Company in place of the late Mr. John E. Cowen. Colonel W. H. RITSON, C.M.G., has been elected Deputy-Chairman, and the Rt. Hon. Viscount RIDLEY has been appointed a Director.

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Mr. GEORGE EVETTS, M.Inst.C.E., M.Cons.E., has been appointed a Director of the Oriental Gas Company.

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Mr. D. WEST, Assistant Engineer and Manager to the Port Talbot Gas Department, has been appointed to succeed Mr. James Walker as Engineer and Manager to the Porthcawl Gas Department. It is understood that the services of Mr. Walker are being retained for a period of twelve months in an advisory capacity.

Letter to the Editor

Damage to Water Heaters

SIR,—I have read with considerable interest the paragraph under the above heading in your issue of Jan. 18. I was rather surprised to note the suggestion that, in cases of hire-purchase with free maintenance, it is the responsibility of the consumer to make good loss due to damage by frost, on the ground that such damage does not come within the description "wear and tear."

I hardly think that the question of "wear and tear" enters into the matter at all. It is a principle of common law that loss, in default of agreement to the contrary, falls on the owner of goods, and the essence of a hire-purchase contract is that the property in the goods remains vested in the seller until the contract is terminated. This being so, I suggest that damage caused by frost would, in the circumstances you mention, be the responsibility of the gas undertaking.

Yours, &c.,
A. HUTCHINSON.

76, *Eastern Road,*
Wylde Green,
Birmingham,
Jan. 24, 1939.

Forthcoming Engagements

February.

2.—Midland Juniors.—Paper by F. A. Reynolds, "Some of the Uses for Gas at Wolverhampton."

3.—L.C.C.A. (Coke Distributors' Branch).—Central Committee, 2 p.m.; Annual General Meeting, 2.30 p.m.

4.—Scottish Eastern Juniors.—Visit to Messrs. William Dixon's Coke Oven Plant, Govan Ironworks.

6.—L.C.C.A. (Coke Distributors' Branch).—Technical Committee, 2.30 p.m.

7.—I.G.E.—Research Executive Committee, 2.30 p.m.

8.—L.C.C.A. (Coke Distributors' Branch).—Advertising Committee, 3 p.m.

11.—Scottish (Western) Juniors.—Paper by D. Beavis, of Helensburgh, on "The Modern Domestic Field."

14.—I.G.E.—Finance Committee, 10 a.m.; Membership Committee, 11 a.m.

14.—London and Southern Juniors.—Paper by A. Ronca on the 1937 Factory Act (at the H.O. Industrial Museum).

14.—N.G.C.—Central Executive Board, 2.45 p.m.

16.—S.B.G.I.—Council Meeting, 2.30 p.m.

17.—Southern Association (Western District).—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m.

18.—Scottish (Western) Juniors.—Annual Whist Drive and Dance.

20.—L.C.C.A. (Coke Distributors' Branch).—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.

21.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.

21.—I.G.E.—Ad Hoc Committee on Text Books, Gas Industry House, 5 p.m.

23.—Southern Association (Eastern District).—Meeting at Gas Industry House, 2.30 p.m. Discussion on "Payment of Commission to Employees."

23.—Joint Junior Visit to B.I.F.

25.—Scottish Juniors.—Joint Meeting at Edinburgh. Paper by M. Whittaker, of Robert Dempster & Sons, Ltd., on "Gasholders."

25.—Yorkshire Juniors.—Meeting at Barnsley Technical College. Paper by H. K. Lister, of Holmfirth, "Personal Experiences on a Small Gas-Works."

March

2.—Midland Juniors.—Paper by F. N. Tidball, "Structural Principles in the Design of a Waterless Gasholder."

4.—Manchester and District Juniors.—Annual Dinner. Paper by E. Bates, "Operation of Intermittent Vertical Chamber Ovens Combined with Coke Dry Cooling Plant."

9.—Midland Association.—Spring General Meeting. Presidential Address of G. C. Pearson.

11.—Scottish (Western) Juniors.—Visit to Dixon's Coke Ovens, Govan Hill, Glasgow.

13.—Scottish (Eastern) Juniors.—Visit to Newbattle Colliery of the Lothian Coal Company, Ltd.

14.—London and Southern Juniors.—Paper by L. F. Randall, "The Servicing of Gas Apparatus."

16.—Midland Juniors.—Visit to Staveley Coal and Iron Company, Ltd., Chesterfield.

News of the Week

The Caloritic Value of the gas supplied by the Lea Bridge District Gas Company will on and after May 1 next be reduced from 500 to 480 B.Th.U. per cu.ft.

The Midland Association are holding their Annual General Meeting at the Grand Hotel, Birmingham, at 2.30 p.m. on Thursday, March 9, when Mr. G. C. Pearson (Engineer-in-Chief of the Birmingham Corporation Gas Department) will read his Presidential Address.

The Amount Apportioned to the Scunthorpe Gas Undertaking in connexion with the construction of the £22,000 combined gas and electrical showrooms and library to be built at the corner of High Street and Oswald Road, Scunthorpe, is £4,500. Application is being made for sanction for a loan.

New Branch Showrooms in a prominent position on the main Brighton Road were opened last Monday for the Croydon Gas Company's consumers in the large and rapidly growing area of Coulsdon. An illustrated description of these attractive new premises will be given in next week's issue of the "JOURNAL."

The Merging of the Commercial Management of the Electricity Department with the Gas and Water Departments has been referred to the Oldham Electricity, and Gas, and Waterworks Committee for their observations. If any of the Committees is averse to the change, it will be required to give its reasons. Central buying is also engaging the attention of the Oldham Town Council. A sub-committee of the Finance Committee is being set up to enquire into the possibilities of a comprehensive scheme for the central purchasing of all commodity requirements of the Corporation.

Copies of the Following recently issued British Standard Specification can be obtained from the Secretary of The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1, price 3s. 6d.: No. 143—1938. Malleable Cast-Iron and Cast-Copper Alloy Pipe Fittings (Screwed B.S.P. Taper Thread) for Steam, Water, Gas, and Oil (Superseding No. 143—1922 and 154—1922); No. 823—1938. Density-Composition Tables for Aqueous Solutions of Sodium Chloride and of Calcium Chloride for Use in Conjunction with British Standard Density Hydrometers; and No. 824—1938. Density-Composition Tables for Aqueous Solutions of Caustic Soda for Use in Conjunction with British Standard Density Hydrometers.

Revised Plans Are In Hand for the erection of gas showrooms in Newton Road, Middlesbrough.

Application Is Being Made by the Hinckley Gas Committee to the Ministry of Health for sanction to borrow £2,990 for new mains. A sub-committee is inspecting several benzole extraction plants with a view to the installation of a plant at Hinckley Gas-Works.

A Bulk Supply of Coke Oven Gas is being considered by the Nottingham Corporation. This would be taken from a new coke oven plant to be built at Hallam Fields by the Stanton Ironworks Company. The plant would produce some 5 million cu.ft. of gas per day, and it is anticipated that it will be in operation by the end of the year.

Members of the Illuminating Engineering Society will pay a visit to the Research Laboratories of the British Thomson Houston Company (Rugby) on Tuesday, Feb. 14, when a Paper entitled "Research on the Production and Utilization of Light" will be read by Mr. H. Warren. The limiting number for the party having been exceeded the list has now been closed.

The Cantor Lectures for the session 1938-39 will be given at the Royal Society of Arts, John Street, Adelphi, W.C. 2, on Feb. 13, 20, and 27, at 8 p.m., by Sir Gilbert T. Morgan, O.B.E., D.Sc., Sc.D., LL.D., F.R.S., F.I.C., A.R.C.,Sc., formerly Director of the Chemical Research Laboratory, Teddington, on "Achievements of British Chemical Industry in the Last Twenty-Five Years."

The Purchase of Gas in Bulk from the Welsh Navigation Steam Coal Company, Ltd., is among the provisions of a Special Order for which the Rhondda U.D.C. intend to apply to the Board of Trade. The Order also seeks to transfer to the Council the undertaking of the Ferndale Gas Company. The latter Company, according to the latest figures, has an annual make of 14 millions and supplies some 1,500 consumers.

A Further Lecture to the Outdoor Staff of the Distribution Department took place at the Chief Showrooms of the Sheffield and District Gas Company on Jan. 19. On this occasion Mr. W. B. McLusky, of Messrs. Sidney Flavel & Co., Ltd., Leamington, gave a talk on "Appliance Construction—Particularizing the Flavel Gas Cooker." The lecture was accompanied by an interesting series of lantern slides, and a keen discussion followed.

Amalgamation and Grouping

Churnet Valley and Cheadle.

The acquisition of the Cheadle R.D.C. Gas Department is one of the provisions of a Special Order for which the Churnet Valley Gas Company intend to apply to the Board of Trade under the Gas Undertakings Acts, 1920 to 1934. It is proposed to alter the name of the combined undertaking to the Cheadle and Churnet Valley Gas Company, Ltd.

"GAS JOURNAL" Directory

In order that readers may be able to keep the particulars contained in the "JOURNAL" Directory up to date, we summarize in the following list various changes during the past month:

Page 14. CARLISLE. J. G. Aitken appointed E. & M. vice J. E. Blundell retired.
„ 46. MELTON MOWBRAY. A. R. Jubb, E. & M., deceased.
„ 54. PORTHCAWL. D. West appointed E. & M. vice S. Walker retired.
„ 58. RUSHDEN. T. Watson appointed E. & M.
„ 62. SKELMERSDALE. R. O. Roberts appointed E. & M.
„ 70. TRURO. G. F. Rickard appointed S.

On p. 144, under the heading "Cumberland—the Allerdale Coal Company, Ltd.," it is stated that the 50 coke ovens owned by that Company are closed down. This is incorrect. The Company inform us that the ovens are in full operation.

Women's Gas Council

Burnley Branch Inaugurated

Mr. A. F. Ames, Engineer and Manager of the Burnley Gas Department, speaking at the inaugural meeting of the Burnley branch of the Women's Gas Council, explained that while his Department naturally wanted to sell gas, to dispose of its products should not be the sole aim of a Corporation undertaking. Service was the only justification for Corporation control of a public service undertaking, and the object should not be to make profits or relieve the rates, but to run the Undertaking in the best interests of the public. Mr. Ames estimated the value of appliances in Burnley homes to be at least £500,000.

Birmingham Circle Visit Fire Station.

Upwards of 800 members of the Women's Gas Circle visited the new Central Fire Station in parties during the past fortnight at the kind invitation of Mr. A. R. Tozer, O.B.E., the Chief Officer of the Birmingham Fire Brigade.

The visitors spent a most interesting time inspecting the modern types of fire engines and equipment, being particularly impressed by the highly efficient organization and the short space of time which elapsed between the receipt of an emergency call and the departure of the engines from the station.

It is always a point of interest to the members of the Circle to know that the services of "Mr. Therm" are being utilized; in this instance gas-fired steam boilers are installed for heating the premises and for the drying of the long lengths of hose after use.

Gas Light and Coke Company

Dividends

The Gas Light and Coke Company announce that the Accounts of the Company for the past year show a balance to the credit of the net Revenue Account which will enable the Directors to recommend the payment of dividends for the half-year to Dec. 31 last as follows:

	£	s.	d.	
On the 4% consolidated preference stock at the rate of	4	0	0%	per annum
On the 3¾% redeemable preference stock, 1970, at the rate of	3	15	0	,, ,,
On the 3½% maximum stock at the rate of	3	10	0	,, ,,
On the ordinary stock at the rate of	5	12	0	,, ,,

This leaves to be carried forward the sum of £53,598.

The above dividends are the same as those for last year, but the carry forward of £53,598 compares with £102,376 7s. 2d.

Sequel to Southport Gas Enquiry

Charges against Engineer and Deputy

On Jan. 25 at the Southport Police Court a number of summonses were brought against the Southport Gas Engineer, Mr. J. H. Clegg, and the Deputy Gas Engineer, Mr. W. E. Plevin. The magistrates granted an adjournment until Feb. 22 in order that the defendants could have time to prepare their defence.

The summonses were as follows:

Against Plevin and Clegg jointly: Did conspire together and with Gerald Illingworth, Eric Grainger, Thomas Howard, Louis Marchant, and other persons unknown, by divers subtle devices to cause a gas examiner appointed under the Gas Undertakings Acts, 1920 to 1934, to make tests to ascertain whether the Southport Corporation were supplying gas in conformity with the Statutes for the time being in force as to the calorific value and purity of the gas, to conduct his tests upon gas specially prepared by you for the purpose and not truly representative of the quality of gas ordinarily supplied by the Southport Corporation to its consumers, and in so doing did unlawfully effect a Public Mischief between Oct. 26, 1936, and Jan. 20, 1938.

Against Plevin and Clegg jointly: Did conspire together and with Gerald Illingworth, Eric Grainger, Thomas Howard, Louis Marchant, and other persons unknown, unlawfully to supply to consumers purchasing gas from the Southport Corporation a gas of a calorific value lower than the declared calorific value which the Southport Corporation were under an obligation to maintain, and in so doing did unlawfully effect a Public Mischief between Oct. 26, 1936, and Jan. 20, 1938.

Against Plevin and Clegg jointly: Did conspire together and with Gerald Illingworth, Eric Grainger, Thomas Howard, Louis Marchant, and other persons unknown, unlawfully to supply to consumers purchasing gas from the Southport Corporation a gas of a calorific value lower than the declared calorific value which the Southport Corporation were under an obligation to maintain, and in so doing did unlawfully effect a Public Mischief between Oct. 26, 1936, and Jan. 20, 1938.

Against Plevin: Did conspire with Louis Marchant and other persons unknown unlawfully to obstruct the Gas Examiner appointed under the Gas Undertakings Acts, 1920 to 1934, to test the purity of gas supplied by the Southport Corporation in the execution of his duties, and in so doing did unlawfully effect a Public Mischief on Jan. 11, 1938.

Against Plevin: Did conspire with Gerald Illingworth, Eric Grainger, Thomas Howard, Louis Marchant, and other persons unknown, unlawfully to alter the adjustment of a Boys Calorimeter certified by the Gas Referees and used for the purposes of testing the calorific value of gas supplied by the Southport Corporation so that the said calorimeter should read high and in so doing did unlawfully effect a Public Mischief between July 1, 1937, and Dec. 14, 1937.

Developments at Southport.

We recorded last week the appointments of Mr. J. L. Anderson, late of the Gas Light and Coke Company, as temporary Gas Engineer at Southport, and of Mr. A. E. Sumner, who is loaned by the Company, as temporary Deputy Gas Engineer. At a meeting last week of the Town Council these appointments were confirmed, it being emphasized by the Mayor that they are only temporary, though the two engineers are prepared to stay until Southport's difficulties are overcome.

At the same special meeting of the Council, at which gas affairs were debated for one hour and forty minutes, a resolution was carried transferring the functions of the Gas Committee to a new Committee consisting of the Mayor and 14 other members.

Damage By Frost to Gas Water Heaters

A water heater expert has compiled the following notes on a subject which was much under discussion a few weeks ago

It is a well-known fact that on freezing water, in becoming ice, increases its volume by approximately 9%. When water freezes this expansion must take place and will normally cause fracture or distortion of any pipe or container unless the conditions of freezing are such that it is possible for the expansion to be relieved in a longitudinal direction.

For this reason, gas water heaters are normally equipped with a drain plug to which is attached a label stating that in frosty weather the drain plug should be removed and the appliance drained. A note to the same purpose is normally included in the installation instructions sent out with each heater. It is of vital importance that the label and the instructions should be left with the consumer, and the consumer instructed in the correct procedure.

Damage through frost is possible with gas water heaters equipped with means of emptying only if the instructions supplied with the appliances are ignored. This damage may take the form of distortion or fracture of castings, hot brass pressings, &c., or may cause joints of tubes, coils, &c., to be fractured. The latter difficulty can be almost entirely eliminated by suitable design of the combustion chamber and heat exchanger.

In some cases the housing screws of water sections may fracture, but this is in a way desirable, since it may give pressure release and save damage to the casting, which would be considerably more expensive to replace.

The following notes apply equally to instantaneous gas water heaters, storage heaters, circulators, and central heating boilers:

(1) It is not sufficient to turn off the main water stop tap and open the hot water taps, as this will not necessarily empty the water from the gas appliance.

(2) With storage systems it is likely that the first points to be frozen will be the cold water pipe supplying the ball-cock and the upper portion of the expansion pipe. Care should be taken to see that these points are adequately protected against frost.

(3) With a storage system it may be found impossible to draw any water owing to the first of the causes mentioned in (2) above, or to a coating of ice being formed on the surface of the cold water supply tank. Immediate investigation should be made of these points in the event of the hot water supply failing in order to prevent further damage by frost to other parts of the installation.

(4) With storage systems any blockage of the expansion pipe by ice is difficult to trace and may easily cause damage through expansion being prevented when the installation is put into use. One method of checking that the expansion pipe is free is to connect the main cold water tap at the kitchen sink with the hot water tap by means of a piece of hose pipe and open both taps. If the expansion pipe is free, cold water under mains pressure will be forced through the expansion pipe.

While insurance companies may be expected to cover under the terms of domestic policies any damage due to leakage of water in a similar manner to the cover afforded for damage to normal domestic pipes and fittings, it cannot be expected that they will cover the gas appliance *per se* any more than they should be expected to cover damage to the radiator or cylinder block of a motor car which is damaged by frost. For this reason it is important that all concerned should make proper use of the instructions issued with the appliance and should drain the system when weather conditions are likely to necessitate this.

Athletic and Social

Bradford Staff Dinner.

The officials of the Bradford Corporation Gas Department held their Annual Staff Dinner on Saturday, Jan. 21, at the Great Northern Victoria Hotel, Bradford.

Mr. J. W. Horwill (Commercial Assistant), who has completed 40 years' service with the Department, was the recipient of a present subscribed for by the Staff. Mr. G. E. Currier (Gas Engineer and Manager), in making the presentation, said that the Department was indebted to Mr. Horwill for the excellent work he has done and is still doing. Alderman F. J. Cowie (Chairman of the Gas Committee), Councillor Alton Ward (Deputy-Chairman), and Mr. Charles Wood (ex-Gas Engineer) also expressed their appreciation. Mr. Horwill suitably responded and alluded to the very happy associations he had formed during his period of service.

Among others present were several retired members of the Staff, including Mr. E. J. Sutcliffe (ex-Gas Engineer).

A "Radiant House" for St. Helens

Gas Industry Championed

Following the opening of new gas showrooms at the corner of Ormskirk Street and Cotham Street on Jan. 26, Alderman Sir James Crooks, J.P., Chairman of the St. Helens Gas Committee, referred to the great increase that had taken place in output in the Gas Industry not only in St. Helens, but also in other parts of the country, and Sir Frederick West, C.B.E., J.P., stated that the increased consumption of gas in this country was only typical of what was happening in other parts of the world.

The Mayor (Councillor N. Birch) presided at the opening ceremony, and among those present were representatives of Manchester, Stockport, and other local authorities.

The Mayor said so far as the Gas Department of the Corporation was concerned that was a red letter day. He referred to the great advance made by the Industry during the past fifteen years and said they had proved that, far from decaying, as some people had said it was, it was improving. He recently saw an old document relating to the acquisition by the Corporation of the old Gas Company in 1878. Even then it was suggested that electricity would take the place of gas, but to-day, fifty years later, that had been shown to be wrong. Great progress had been made in St. Helens, especially during the past fifteen years.

Councillor Birch went on to speak of the valuable services that had been rendered to the town by Sir James. He recalled that it was in 1902 that he entered the Council and became Chairman of the Gas Committee in 1905—a position he had held ever since. He was Mayor in 1912 and was appointed an Alderman in 1914, but his greatest honour, and one he fully deserved, was his knighthood in 1927.

Sir James said the Gas Committee had always worked in harmony. He paid tribute to the excellent manner in which the contractors had carried out their work and it was a great pleasure to him to name the premises "Radiant House."

During the many years he had been associated with the Gas Committee they had had efficient engineers and managers. In Mr. Greaves, the present Manager, they had an official who fully maintained the high standard that had been set up.

The local Gas Undertaking, he said, had been of valuable assistance to the town. It had handed £130,000 towards the rates as well as help it had given for other purposes.

Sir Frederick West, C.B.E., J.P., proposing a vote of thanks to Sir James, said they were all delighted that Sir James had been able to attend. They thanked him for his long service to the town and especially for his long service as Chairman of the Gas Committee. He would also like to congratulate the other members of the Committee and the Engineer on the progressive movement and also on the enterprise of presenting to the citizens and gas consumers in St. Helens a very fine new showroom. He thought people needed to be reminded of the great service which the Gas Industry rendered to this country. The 11,000,000 consumers they had were drawn from the 12,000,000 families in the country. Because the Gas Industry was 125 years old there were some who said it had had its day and was slipping backwards, but during the period Sir James had been Chairman of the Committee the output had been trebled in St. Helens and had been doubled in the last fifteen years.

Alderman W. Burrows, J.P., Vice-Chairman of the Committee, seconded the vote of thanks, and referred to the valuable work that had been carried out by Mr. Greaves since his appointment as Engineer and Manager.

Thanks were expressed to the Mayor on the proposition of Alderman A. Rudd, J.P., seconded by Colonel Guy Pilkington, J.P.

The architects (Messrs. Biram & Fletcher), jointly with the contractors (Messrs. J. Lucas & Sons), presented Sir James Crooks with a suitably inscribed golden key, with which he had opened the door of the new "Radiant House," as a memento of the occasion.

What Every Woman Should Have

Certificate for Efficiency in Cooking

Opening the cookery demonstrations organized by the Stratford-upon-Avon Corporation Gas Department, at the Town Hall on Jan. 23, the Mayoress (Mrs. T. N. Waldron) expressed the opinion that it should be compulsory for every woman to get her certificate for efficiency in cooking.

Was there, she asked, any responsible position a woman could hold, except in house management, without training beforehand? In her public work, and coming into contact with all classes of the community, she was more and more impressed with the fact that the happiness and health of a household depended not only primarily, but to the fullest extent, upon the capability of the woman in charge. She welcomed most cordially, therefore, any and every opportunity in Stratford to foster and encourage interest in so vital a subject as cooking.

The demonstrations and exhibitions arranged by the Gas Department were of exceptional value for two reasons, continued Mrs. Waldron. First, in addition to the cooking instruction, there was an exhibition of all the modern appliances, and if brides-to-be could see these delightful modern cooking appliances they would realize that a well-equipped kitchen was far more fascinating and interesting than a well-furnished lounge.

"The second reason is this," added the Mayoress. "Many of us are not novices. We come year by year for a refresher course. In conclusion, the Mayoress thanked the Gas Committee and Manager for arranging the demonstrations and exhibition.

Councillor Milward Reynolds (Chairman of the Gas Committee) commented on the improvements which were always being made in the Industry. Mr. Shewring, their Engineer and Manager, took full advantage of every development. Councillor F. Bush, in thanking the Mayoress, emphasized the value of cooking. Mr. F. Shewring congratulated the Mayoress on her address, and referred to her interest in home activities. A box of cakes was presented to the Mayoress.

Miss M. Suddaby, of the Radiation Research Kitchen, gave demonstrations, which were continued throughout the week.

In addition to the demonstrations there was an exhibition of the latest gas appliances.

Manesty Machines Director to Visit South Africa

Our readers in South Africa will be interested to learn that Alderman Edwin Thompson, J.P., Governing Director of Manesty Machines, Ltd., and Thompson & Capper Wholesale, Ltd., Speke Hall Road, Liverpool 19, is sailing for South Africa on a business visit in the "Warwick Castle," leaving Southampton on Feb. 9. Mr. Thompson will stay in Capetown, Johannesburg, and Durban during his visit.

Gas-Operated Wireless as Showroom Display

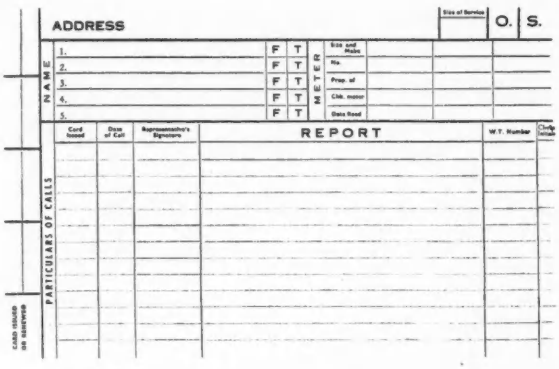
The Harrogate Gas Company recently arranged in their showrooms this display, demonstrating the Milnes Thermo-Electric Generator operating a Murphy Wireless Set.

Eileen Murphy Describes

A Service Record That Pays for Itself

Mrs. Eileen Murphy has just put in a week's work as a member of a team of canvassers which is making a complete gas service record of a big district in North London. When the job is finished, the collected data will be used as the basis for a new policy of sales and service. In the meantime, the record pays for itself while it is being built up. Incidentally, the canvassers have a job which is rich in human interest and which has been proved to yield good average results in the way of sales.

THE scheme started when the Tottenham and District Gas Company absorbed a neighbouring undertaking on the outskirts of London. Among the problems which arise when amalgamations take place, there are two which give scope for fruitful experiment. First, there is the need for the gas manager to get a full and accurate picture of service conditions and sales possibilities in the new area. Secondly, there is the problem of making close contact with the Company's new customers so as to get their goodwill and make them aware of the selling terms and service arrangements which have become available to them under the new management.



The Tottenham Company was anxious to make a rapid, thorough survey of its new district. In the past, some undertakings have used a special type of fitter-salesman for this job; the men went systematically from house to house, inspecting appliances, adjusting them when necessary, and taking opportunities to introduce new business. The disadvantage of this method is its comparative slowness.

The Tottenham Company decided to employ canvassers for their survey. The canvassers were employed through the medium of the Company's authorized dealers (Tate & Co. (Utilities), Ltd.). The decision was based on several years' experience of the use of canvassers, who receive a standardized training and have worked with great success under conditions which fully safeguard the interests of the consumer.*

Fifteen Calls a Day.

The plan which was finally approved provided that each canvasser should make an average of fifteen calls a day, filling in a service record card in respect of each consumer. For this work the canvasser receives a regular wage, which he can (and does) increase substantially by means of commission on the sale of appliances. Conditions are favourable to sales, since the canvasser for the purposes of record-making is allowed to inspect all appliances in each house and therefore has exceptional opportunities for making sales openings; in addition, the area has not been systematically canvassed in the past.

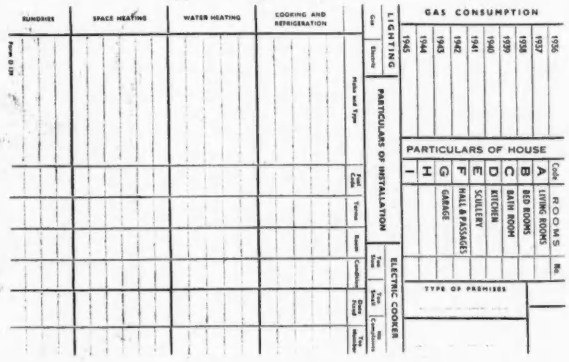
When the area was taken over, a personal letter was sent to each consumer, explaining that a representative would examine all gas appliances to ensure that they are in good condition, and "to compile a record which will facilitate their future servicing."

One of the record cards used is reproduced here. Its immediate purpose is to expose any weak spots which may exist in the present gas service, so that these can at once be remedied. Its long-range purpose is first to provide a record which will make it easy for the Company to give quick efficient service in case of complaint, since all particulars of the consumer's installation will be at hand; and secondly to form a basis for systematic selling and advertising campaigns in the future. The original card will be re-issued at regular intervals, thus providing future canvassers with comprehensive information prior to calling. A Company which knows the number, age, and type of all the fuel appliances used in its district has no need to resort to guesswork in formulating its sales plans. Such information is especially valuable in campaigns against competitive appliances.

Interest and Thrills.

A day in the life of a canvasser-surveyor is not without interest and even thrills. I myself was set to work in a district of newish houses, mostly built in the last twelve years to a uniform and slightly depressing pattern. Most of them had been divided by the landlord into small flats—two flats to each house. Rents ranged between sixteen shillings and a pound a week.

I was always pleasantly received, and I found afterwards that this was the general experience, for in the course of 14,000 calls the canvassers have only been refused admission



at six houses. In several cases the housewives were surprised to see that the Company's representative was a woman, but in one house I found my sex an advantage, because the lady there was very scantily attired and would certainly not have admitted a male canvasser.

The first job in each house was to measure the size of the service and to check the type, age, and size of the meter. In

* A correspondent's account of the canvassing system at Tottenham was published in the "JOURNAL" on Jan. 12, 1938.

some cases this was difficult, and involved either climbing on a chair, to the great danger of my skirt-hem, or grovelling in the depths of a cupboard. Nor was I put at my ease by the frolics of domestic pets. Dogs always construed my actions as an invitation to play, and twice when I was on my knees flashing a torch at a meter in a dark corner I was startled to find kittens jumping on my shoulders. However, I was spared the ordeal of one of my colleagues who found two rats fraternizing on the meter.

As in many housing estates, no provision had been made for warming the small kitchens, which in many cases included a boarded bath. A surprising feature of the survey in this section was the large number of cheap oil heaters in use in the kitchens. It was common also to find a little kettle or pot placed on top of the oil heater for simmering. In such houses there would seem to be a clear case for the sale of small gas heaters, but experience there shows that a good deal of persuasion is needed to break down the strong prejudice against spending money on a kitchen which is not also used as a living room.

One result of the splitting-up of the houses into flats was that only the tenants in the top half of each house had the amenity of a properly fixed bath. One woman said to me: "Those of us who have baths have no hot water, and those who have hot water have no bath." This was an exaggeration, for a number of bath-proud tenants had installed gas water-heaters, but there was an element of truth in the statement. Perhaps the most surprising discovery was a flat with an expensive water-softener but no hot water system.

It is anticipated that the survey, comprising more than 25,000 consumers, will be completed by the end of seven months. An interesting plan has been advanced for future sales coverage. This is that the district should be broken down into sections of 6,000 consumers, and that an experienced canvasser should be allotted to each section, so that each consumer should receive a sales call at least once every year. The canvasser will have the advantage of a complete sales record which he will be able to keep up to date.

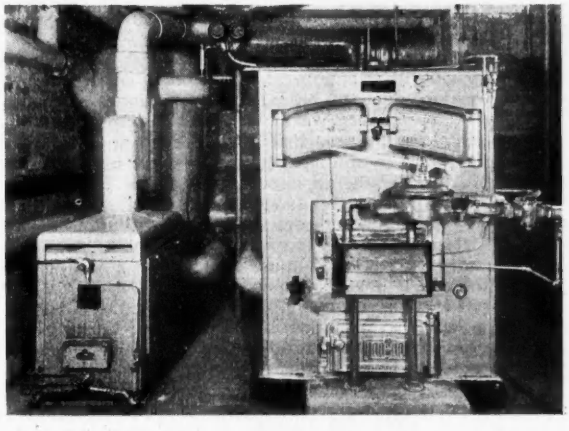
In the meantime the survey continues according to plan, and pays its way in sales as it goes on.

New Dorset County Clinic Chooses Gas

Gas is used extensively in the new Dorset County Clinic at Dorchester; and the following notes and illustrations, forwarded by Mr. R. Morton (Engineer and Manager of the Dorchester Gas and Coke Company), give an idea of this interesting installation—where convenience and cleanliness are of paramount importance.

The New Clinic.

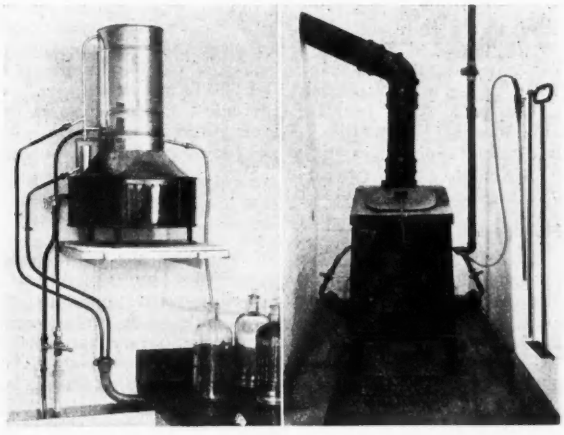
THE building is centrally heated by the "Panelite" system of accessible panel heating, which was installed by Messrs. Benham & Sons, Ltd. The central heating boiler is a "Robin Hood" fitted with a gas conversion set manufactured by British Furnaces, Ltd., and equipped with Satchwell thermostats and clock control. The hourly output of this boiler is 410,000 B.Th.U.



Boiler House, showing Gas Boiler and Conversion Set.

An average of 700 gallons of hot water daily are required in the building and this is supplied by a Potterton 4-section "D" series gas-fired boiler, which is also under thermostatic and clock control.

Gas is also used in the Clinic for the destruction of all refuse, for refrigeration in the milk department, for sterilizing, both by steam and hot air, for production of distilled water, for washing and drying of chemical apparatus, and for incubation in addition to other laboratory uses.



Stainless Steel Still. Refuse Destructor.

The building was erected to the design and under the supervision of the Dorset County Architect, Mr. H. E. Matthews, A.R.I.B.A.

DISTRICT CONDITIONS IN RELATION TO THE Maintenance of Gas-Fired Hot Water Appliances

by

LEOPOLD FRIEDMAN,

Chief Engineer and Assistant Managing Director, Ascot Gas Water Heaters, Ltd.

From a Paper given to the Western Junior Gas Association on Jan. 21, 1939.

Continued from page 239.

Water.

Pressure Variations.

The best method of ensuring a constant water pressure is to install a cistern with ball valve in the roof space, so as to ensure a constant and adequate flow of water through the installation. This is the best normal practice. The water tank gives additional storage to the water supply authority and in this way peak demands are avoided, which gives satisfaction not only to the water engineer, but also to users of appliances connected to the water main in the vicinity.

Sink gas water heaters, on the other hand, should be connected directly to a suitable main water supply, as the water will be used for drinking and culinary purposes. It is also usual, and permissible, for bath gas water heaters of the open outlet type to be connected directly to the main water supply. These types of heaters have a water tap fitted to the appliance itself, and it is an easy matter to adjust water flow to give the desired temperature by means of this tap, whatever the water pressure at the time may be.

In the case of multi-point heaters controlled by taps situated in other rooms, control is not so easy, and for this reason multi-point gas water heaters should, wherever possible, be connected to a tank water supply.

It has, unfortunately, been found impossible in certain cases to obtain the requisite head of water for the installation and permission can be obtained from the local water authority for the appliance to be connected directly to the main water supply on specifying the make and type of appliance.

The majority of water supply authorities will grant permission for main connexion, but this cannot be expected to guarantee supplies at unvarying pressures. For this reason a special gas water heater has been developed which incorporates a water governor and water temperature selector, enabling the consumer to obtain water at any desired temperature from 40° F. to 107° F. without manipulation of the hot-water tap. This new appliance is quite suitable for water supplies varying in pressure from a minimum of 15 lb. per sq.in. to a maximum of 200 lb. per sq.in.

Where the water pressure falls below 15 lb. per sq.in. this appliance is not suitable. Water authorities, however, will not permit appliances to be connected where the pressure is less than 15 lb. per sq.in. Such inadequate pressure is clearly due to an inadequate distribution system.

Hardness.

The effect of the hardness of water on the maintenance of gas water heaters has been greatly exaggerated, for it has been found that even with boiling-water appliances the extra maintenance entailed is negligible. A boiling-water appliance operating with water of a temporary hardness of 13° Clark, and installed in a household of six people, has given eighteen months' heavy service without descaling becoming necessary.

It is, however, advisable that gas water heaters should be descaled from time to time, and that their design should be such as to reduce scale formation to a minimum.

The design to ensure minimum scale deposition should embody the following points:

(*a*) The water-ways should be small in order to give high velocity, but not small enough for the scale to decrease the cross-sectional area rapidly. Flattened tubes should not be used, as they tend to accelerate the restriction set up by scale due to the larger ratio of the perimeter to the cross-sectional area.

(*b*) The water content of the heat interchanger should be small, as most of the scale occurs after the water tap has been turned off and the water in the heater becomes stationary.

(*c*) Smooth copper should be used, and sharp changes of direction avoided.

(*d*) The water-ways should be so designed that when the descaling takes place the acid used can quickly dissolve the scale.

(*e*) The heater should be so designed that it can be easily dismantled.

(*f*) The appliance should be designed so that it can be descaled *in situ* if so desired by the consumer.

Miscellaneous.

Water coming through old mains and services and from certain sources may contain various small amounts of debris, such as rust and innocuous algæ, which, if allowed to pass through an appliance, may cause blockage in small ducts and orifices, which are sometimes present in automatic valves.

In view of this, it is necessary to provide a suitable and adequate filter, which, while being able to arrest traces of solid matter from the water, can be easily removed and cleaned without having to dismantle the appliance.

Competence of Staff.

If trouble-free operation is to be obtained it is essential that the appliance should be:

(*a*) Correctly installed according to the maker's printed instruction.

(b) Correctly regulated upon installation.

And the user must be instructed in its proper operation.

In view of this it is necessary to have a trained staff who are fully competent correctly to install the appliances and instruct the consumer in their operation.

The selection of the right type of man is important. For routine maintenance, reliability and tact in dealing with consumers are essential, while for the preliminary work of installation and the regulation a different type of man is required, as it is upon this man that the correct operation and subsequent use of the appliance will depend.

The training of men for maintenance and service work needs very careful attention. I am strongly of the opinion that for maintenance to be satisfactory it is essential that a number of men specialize in water-heating appliances and that to expect the average man to deal with any and every type of appliance is unfair to him, to the consumer, and to the manufacturer of the appliance.

If the system which I advocate is adopted, then one or more men should be set aside by the distribution department to deal with each type of gas appliance.

The training of the staff must conform to a well-devised programme and it must be carried out with meticulous care.

Practical demonstrations should be arranged and the appliances completely examined in detail so that they are fully understood as to their construction and operation. For this purpose special measuring instruments should be used and care taken in their selection and, if necessary, such instruments may require to be specially made in order to demonstrate in a simple way the detailed working of the machine. The instruction should include fundamental theo-

retical principles underlying the design and construction of gas water heating appliances, as well as some tuition in the elements of physics and chemistry.

I am fully aware that the planning of the layout of such an instruction centre involves a great deal of preparation, but it will be amply repaid by the result in practice.

It is unfortunate that there are so few really well-equipped instruction centres provided by gas appliance manufacturers where men can get first-class instruction. The need for such training is vital to the future of the Gas Industry, and it is, I think, due to the Gas Industry that manufacturers should provide the opportunity for such specialized instruction.

Reverting to the suggestion that specially trained men should be used for maintenance service, I realize that for a small gas undertaking it may be difficult to release even one fitter for this purpose, but I think that for those undertakings having more than 200 water heaters installed in their district, at least one man should be specially trained for gas water heater maintenance.

Adequacy of Gas Supplies.

It is of great importance that all concerned with the installation of an appliance should be fully conversant with the capacity and the run of the gas pipes, as they may affect the new appliance to be installed. For example, an instantaneous sink gas water heater consuming gas at the rate of some 80 cu.ft. per hour connected to a five-light meter by means of upwards of 50 ft. of ½-in. pipe is almost certain to give rise to complaint, for the heat input to the appliance will be restricted and dissatisfaction will result.

Adequacy of Water Supplies.

The adequacy or otherwise of water supply must be carefully checked before a new gas water heater is installed. If the water supply is from a tank the "head" must be sufficient to ensure the requisite flow of water through the pipes and fittings as well as through the heater itself. If direct connexion to the main water supply is made information should be obtained regarding the character of the supply, and checked by connecting a water-pressure gauge to the main water tap close to the point of installation of the heater and by the pressure drop, if any, observed if possible in adjoining premises. A similar check should be made by observing the actual flow of water from this tap, as with a length of small bore pipe there may be good static pressure, but owing to the resistance of the pipe too small a flow of water.

Extent of Service Maintenance of Appliances.

Cleaning.

(*a*) Cleaning the heating body.
(*b*) Inspection of the water filter.
(*c*) Inspection of hot water tap washers.
(*d*) Removal of external dirt.
(*e*) Checking gas and water rates of flow (input and output).

The time required for this work will be analyzed later. For maintenance costs to be reduced to a minimum the accessibility of the working parts of the heater is a most important factor, for the time taken for normal maintenance of an appliance can be doubled if it has to be removed from its fixed position before access to the combustion chamber and heat interchanger is possible for cleaning.

Descaling in Hard Water Districts.

The time taken to descale a heater depends on accessibility, and whether it can either be done *in situ* or at the works of the gas undertaking. The latter method is preferable where a large number of heaters have to be serviced. The frequency of descaling will be discussed later.

Special Complaints.

If regular maintenance is carried out efficiently, special complaints will be reduced to a minimum. The experience of our own Service Department has demonstrated this. Complaints of heaters which are regularly and properly maintained are rare.

Preliminary Survey.

Before putting a maintenance scheme into operation a preliminary survey is required and certain tests should be made in order to estimate the probable frequency of maintenance visits and the necessity for descaling.

The frequency of normal maintenance will depend largely upon the nature of the products of combustion. Thus, in a district where the sulphur content is low the accumulations of salts in the combustion chamber will take a comparatively long time.

It is possible for the heater to operate satisfactorily until the accumulation of salts reaches a point at which the flow of the products of combustion is impeded, and the CO_2 content has risen to the limiting figure of 0·8 of the possible maximum CO_2 content.

It is desirable, therefore, to carry out life tests in the laboratory and ascertain the number of hours the heater can be worked before the limiting CO_2 is reached. This is best done by putting an intermittently operated water cock on the inlet to the heater, with a by-pass giving a flow less than the minimum necessary to operate the automatic valve, so that during the "off" period the heater is cooled. With this arrangement a fair approximation to district conditions can be obtained.

A correctly designed gas water heater should run for at least 200 working hours with a gas of average sulphur content before the CO_2 reaches the limiting point.

Thus, if the estimate for one year's use is taken, the heating unit for a multi-point and also a sink appliance should require to be cleaned once a year. This, however, does not mean that only one regular maintenance call per year should be made, as other considerations may make it necessary for two visits to be made. If more than two visits per annum are necessary, a special investigation should be made to determine the cause, and the maker of the appliance should be asked to co-operate in the investigation of the cause.

In the case of a bath heater, which is used at less frequent intervals than either a sink or a multi-point gas water heater, cleaning should not be necessary more than once a year.

Descaling in Hard Water Districts.

The determination of the frequency of descaling is a more complicated matter as a number of indeterminate variables are involved.

Scale formation varies directly as:

(1) The square of the temperature of the water.
(2) The square of the hardness of the water.
(3) The quantity of water used.
(4) Inversely as the velocity of water flow.

Point (3) is difficult to determine, and it varies from house to house. It is, however, possible to strike an average and treat special cases individually.

The following tests should be carried out to get an idea of the required frequency of descaling. A heater should be tested with an intermittent water supply, but no water by-pass should be incorporated in this case, as most of the scale occurs after the water tap has been shut off.

It will be found that, owing to the special construction of the heater and to the fact that the temperature of the hot water is below 140° F. scale deposition is slow, the descaling of multi-point water heaters is much less frequent than that of a sink heater which provides water at a higher temperature. To ascertain, therefore, the time between descaling periods it is necessary to test individually each type of water heater.

A table is appended which gives a rough guide as to the frequency of descaling for each type of appliance and for waters of varying hardnesses.

TABLE III.—*Years of Service Before Descaling Becomes Necessary for Different Types of Domestic Water Heaters Supplied with Waters of Various Hardness.*

Temporary Hardness °Clark.	Multi-Point.	Bath Heaters.	Sink Heaters.	Boiling Water Appliance.
0–8	4	4	3	2
8–13	3	4	2½	1½
13–17	2½	3½	1½	1
17–25	2	3	1	—
25–30	1½	2	1	—

These periods are only approximate and are possibly conservative estimates.

Organization of Maintenance Scheme.

I propose to outline a scheme for an imaginary undertaking, and to assume that this undertaking has the following gas water heaters on its district:

(*a*) 1,000 sink heaters.
(*b*) 500 multi-point heaters.
(*c*) 250 bath heaters.

It is required to determine the number of maintenance visits necessary for each type of appliance and to arrive at the number of men required for the purpose.

The figures given below are those obtained from actual experience gained by our Service Department. Two schedules are given, one being for fully trained men, and the other for men not so competent.

Time Required per Heater (in Minutes).

	Time Required, Including Walking Time. (*a*)	(*b*)
Sink heaters	40	35
Multi-point	45	40
Bath heaters	45	40

(*a*) Less competent men. (*b*) Fully trained men.

The time allowed for walking appears to be short, but if the system is organized so that the heaters are classified into districts this time is on the generous side, especially if it is possible to combine water heater with refrigerator maintenance.

The total time in hours required to service 1,000 sink heaters and 500 multi-point heaters at two visits per annum, and 250 bath heaters one visit per annum, is

$$\frac{(1{,}000 \times 35 \times 2) + (500 \times 40 \times 2) + (250 \times 40)}{60} = 2{,}000 \text{ hours.}$$

The number of man-days required to service 1,000 sink heaters, 500 multi-points, and 250 bath heaters, assuming an 8½-hour day and 30 minutes' office time, making 8 hours per day on the district = 50 man-days.

The number of maintenance fitters required, assuming 260 working days per year $= \frac{250}{260} = 0{\cdot}96$

It is, therefore, possible for one man to service all the heaters, but it is a more satisfactory arrangement if two men do the work and the time taken is divided between them. It can be arranged that the men are employed for half a week on water heaters and for half a week on some other appliances, or, as already suggested, gas water heater and refrigerator maintenance can be done by the same men.

A few minor complaints outside regular maintenance may arise, but in all probability these will not amount to more than one-tenth of the time required for the regular maintenance.

In addition some supervision of the maintenance staff will be required; the duty of the supervisor will be to opportion the work each day and to supervise its execution.

Tool Kit and Spare Parts.

Tool kits and spare parts will be required as follows:

Tool Kit.

Adjustable spanner.	Watch with second hand.
Large screwdriver.	Flexible steel rule (6 in.).
Small screwdriver.	Spring balance (0–25 lb.).
Combination pliers with wireworking nose.	Thermometer in case (32°–220° F.).
	Six-in. gas pressure gauge.
Pair footprints.	Tin of "boss" white.
Flat file.	Duster.
Half-round file.	2 Primus prickers.

Spare Parts.

Rubber diaphragms for each type of appliance.
6 Steatite pilot tips.
Jumper washers for each type of appliance.
6 sets of fibre washers for each type of appliance.

Floating Stock of Spare Parts to be Kept in Stores.

Sink heaters	1 doz. diaphragms. 2 doz. sets of washers. 3 doz. pilot tips. 2 burners. 6 heating bodies.
Multi-point heaters	1 doz. sets of washers. 2 doz. pilot tips. 6 diaphragms. 3 heating bodies. 2 burners.
Bath heaters	1 doz. sets of washers. 2 doz. pilot tips. 6 diaphragms. 3 heating bodies. 2 burners.

Descaling.

Assuming a temporary hardness of water of 10° Clark, and consulting Table III., descaling should be effected as follows:

Sink heaters	Once every two years.
Multi-point heaters	Once every three years.
Bath heaters	Once every four years.

depending upon the extent of their use in daily service. Thus, the average number of heaters to be descaled per year will be:

Sink heaters	400 (or approximately 2 per day).
Multi-point heaters	171 (or approximately 1 per day).
Bath heaters	63 (or approximately 1 every 4 days).

With suitable equipment and competent labour this work can be completed in about 1½ hours per day. This is assuming that double journeys do not have to be made for descaling, heating bodies being kept in circulation for replacement when the need for descaling occurs.

These spare heating bodies can be delivered and those to be descaled collected by the supervising fitter when he does his rounds.

Descaling Equipment Required.

The plant consists of:

(*a*) One rubber-lined or porcelain sink for multi-point heating bodies.
(*b*) One rubber-lined descaling tank with hose and nipples for sink and bath heaters.

The cheapest satisfactory descaling fluid is hydrochloric acid, and the approximate quantities are as follows:

Sink heaters	½ pint.
Multi-point heaters	1½ pints.
Bath heaters	1 pint.

A strength of 1—5 to 1—7 of hydrochloric acid to water is required according to the nature of the scale.

Records.

A junior clerk will be required for three hours per day, who should be able in that time to cope with the work of keeping records, which should be as follows:

Follow-up Cards.—These should be kept in duplicate as follows:

(*a*) Name index, alphabetical. (Form A.)
(*b*) Street and datal index. (Form B.)

The latter should be divided into districts and areas, and be further sub-divided into the weeks of the year.

The clerk should review the number and the location of the heaters to be serviced during each week and should subdivide them into their respective districts and give to the supervising fitter the appropriate cards. After the day's work, the supervising fitter should return the completed cards to the clerk, who will check and examine them. The information is then copied on to the duplicate cards in the alphabetical name index, the originals are returned to the datal and district index and dated forward twenty-six weeks.

A certain amount of elasticity in the distribution of the work will be necessary, as one cannot always arrange for the even distribution of the work throughout the year, or for any one district.

Special Servicing Forms.

If it is found that special attention to a heater is required during the regular maintenance work, form B should be used, and a note of the reference number should be made on the follow-up card. Special complaints arising between ordinary maintenance visits should be entered on special service forms (B) and a note entered on the follow-up card. This will ensure that a complete record of each heater is readily available at any time.

FORM A.

..... Gas Company. .....Water Heater

Name..... Type.....
Address..... Maker .....
..... Clean every.....months.
Makers' No..... Descale every.....months.

Date.	Cleaned.	Descaled.	Special Complaints, SO Number.	Date.	Cleaned.	Descaled.	Special Complaints. SO Number.

Columns to be continued on reverse side of card.

FORM B.

CLIENT'S ADVICE. REFERENCE..... DATE.....

ADVISED BY.....

CLIENT'S REPORT:—

SERVICE ENGINEER'S REPORT. WORKS NO..... TYPE.....

Gas..	....C.V. (B.Th.U. per cu.ft.) ....Cu.ft. per minute
Quantity of water..	....lb. per minute min.....lb. per minute max.....ft. head
Temperature ..	....° F. at min. flow .....° F. at max. flow .....° F. cold
Storage type ..	Time for thermostat to shut (from cold) ..Min. final temp. ..° F.

(1) Manufacturing fault, namely ..	
(2) Faulty material, namely ..	
(3) Advice *re*	
(4) Cleaning of	
(5) Regulation of	
(6) Wear and tear of	
(7) New parts fitted, namely ..	
(8) Dirt and where found	
(9) Soot	
(10) Back-draught (and why) ..	
(11) Size of meter and pipe.. ..	
(12) ,, cold feed pipe	
(13) ,, hot supply pipe.. ..	
(14) Additional	

Time for journey: .....Hrs. .....Mins. / d. = £
Time arrived .....a.m./p.m. Left.....a.m./p.m.
Time for work: .....Hrs. .....Mins. / d. = £
Fares: .....s. .....d. = £
New parts fitted: .....s. .....d. = £
£

Client's Signature..... Service Engineer's Signature.....

INSTRUCTIONS TO BOOK-KEEPING DEPARTMENT:
Charge: (*a*) Yes Invoice to: .....s.....d.
(*b*) No .....
.....

Invoice No. .....
Date .....

SKETCH OF INSTALLATION AND FURTHER REMARKS OVERLEAF.

SUMMARY OF STAFF REQUIRED.

(*a*) On the district .. 2 junior fitters; 1 senior supervising fitter.
(*b*) In shops .. .. 1½ hours per day for descaling by junior fitter.
(*c*) Clerical .. .. 2 hours per day for junior clerk.

COSTS.

			£	s.	d.
Wages—					
2 fitters at £2 10s. per week (for half their time)			130	0	0
1 supervising fitter at £3 10s. per week (for half his time) ..			91	0	0
1 clerk at £2 per week (for 2 hours per day)			26	0	0
1 descaling hand at £2 10s. per week (1½ hours per day) ..			24	18	0
Materials (replacements)—					
Sink heaters—					
Washers, &c.	250	sets			
Diaphragms (1 per heater per 4 years) ..	250				
Multi-point heaters—					
Washers, &c.	100	sets			
Diaphragms (1 heater per 5 years)	100				
Bath heaters—					
Washers, &c.	50	sets			
Diaphragms (1 heater per 5 years)	50				
Cost of replacements—					
Sink heater washers at 3d. per set			3	2	6
Sink heater diaphragms at 3d. each			3	2	6
Multi-point heater washers at 9d. per set			3	15	0
Multi-point heater diaphragms at 3s. each			15	0	0
Bath heater washers at 6d. per set			1	5	0
Bath heater diaphragms at 1s. 3d. each			3	2	6
Descaling fluid: Hydrochloric acid—					
½ pint acid per sink heater to be descaled ..	8	gall.			
1½ pints acid per multi-point heater to be descaled	27	gall.			
1 pint acid per bath heater to be descaled ..	25	gall.			
Total per annum	60	gall.			
Cost at 3s. per gall.			9	0	0
Overheads and stationery			15	0	0
Replacements of tools, &c.			2	0	0
Half the running and depreciation costs of van (Austin seven type)			45	0	0
Total costs per annum			£372	5	6

The cost per heater per year works out at about 4s. 3d., and, even if maintenance is not included, the most, taking the figures mentioned in the first section of this Paper, is under 0·64d. per therm used. It must be noted that I have taken as an example a comparatively small gas undertaking. The maintenance costs for a larger undertaking would be lower.

In my opinion this work can be satisfactorily carried out by junior fitters providing they are specially trained for the work. If, however, it is felt that this type of man is not suitable and a senior man should be employed then the above costs would be increased by £52 (assuming wages at £3 10s.) to a total of £424 5s. The cost per heater would be 4s. 10¼d. It must also be borne in mind that all the costs are based on two visits per year whereas it would be possible to reduce the number to one visit per year in a district where the sulphur content of the gas is low. With such a system in operation the wages bill could be reduced as follows:

$$\text{Time in hours} = \frac{(100 \times 35) + (500 \times 40) + (250 \times 40)}{60}$$

$$= 1{,}080 \text{ hours.}$$

$$\text{No. of man days} = \frac{1{,}080}{8 \times 260} = 0{\cdot}52.$$

∴ Wages for fitters at £2 10s. per week
= £130 × 0·52
= £67 10s.

Total cost	= £372 5s.
	− 67 10s.
	£304 15s.
Cost per heater	= £304 15s. / 1,750
	= 3s. 6d.

These figures have been confirmed by the analyzed costs of servicing a very large number of heaters installed on the area of a provincial gas undertaking, which works out at 2s. 4d. per visit including descaling. It must be pointed out, however, that no special scheme is in operation in this case and this figure of 2s. 4d. could be reduced if such a specially organized scheme was introduced.

In conclusion I desire to acknowledge the assistance of Mr. G. Harcourt and other members of the technical department staff of Ascot Gas Water Heaters, Ltd., in the preparation of this Paper.

Overseas Opportunities

Gas Meters

H.M. Trade Commissioner at Johannesburg reports that the Johannesburg City Council, Stores Department, is calling for tenders (Contract No. 163) for the supply and delivery of:

100 "Ordinary" closed top type, I.G.E.d4 gas meters.
100 "Ordinary" closed top type high capacity gas meters.

Tenders endorsed "Contract No. 163—Gas Meters" should be addressed to the Town Clerk, Municipal Offices, Johannesburg, by whom they will be received up to noon on Wednesday, March 1, 1939. Tenderers are required to submit to the Store-Keeper Gas Store, not later than the closing date for receipt of tenders, a sample of the meters which they propose to supply. A copy of the specification and conditions of tender may be inspected at the Department of Overseas Trade for three days subsequent to the date of this notification, after which the documents will become available for loan.

Local representation is essential, and the Department is prepared to furnish firms desirous of tendering for the supply of meters of United Kingdom manufacture, and not represented in South Africa, with the names of United Kingdom merchant houses with local connexions who may be willing to handle tenders on their behalf.

All telephonic communications with the Department of Overseas Trade in regard to this tender should be addressed exclusively to Whitehall 9040, Extension 253.

Western Juniors at Cheltenham

On Saturday, Jan. 21, the Western Junior Gas Association inspected the works of the Cheltenham and District Gas Company. After the tour the visitors were entertained at tea at the invitation of the Chairman and Directors of the Company. The thanks of the Association were expressed by Mr. A. Bell (Exeter) supported by Mr. S. Smith (Bristol). Acknowledgment was made by Mr. A. L. Morris, Commercial Manager to the Company.

Following tea, Mr. Leopold Friedman gave a Paper on "District Conditions in Relation to the Maintenance of Gas-Fired Hot Water Appliances."

Coke Oven Gas Supply in the Lake District

Board of Trade Enquiry

On behalf of the Director of Gas Administration, Mr. R. L. Sich held an Enquiry at the offices of the Board of Trade in London on Tuesday, Jan. 24, into applications by the Whitehaven United Gas Company and the Ennerdale Rural District Council for Special Orders under the Gas Regulation Acts, 1930-1934. Although the point at issue was relatively small, the enquiry occupied the best part of a day, and it can perhaps best be explained in a general "story" rather than going in detail through what actually took place. Mr. Jacques Abady, K.C., appeared for the Whitehaven United Gas Company and Mr. H. Royston Askew represented the Ennerdale Rural District Council.

The position is that the Whitehaven United Gas Company, being a non-statutory concern, has been called upon by the Board of Trade to apply for a Special Order to constitute itself a statutory undertaking, and this was the purpose of the application so far as that Company was concerned. Included in the application is an extension of area to a number of parishes bordering on the area now supplied by the Company and in these additional parishes is the parish of Moresby.

The Ennerdale Rural District Council is a more or less recently constituted authority under the review of local government areas which took place a few years ago. Under its constitution the Ennerdale Rural District Council has taken over three smaller rural district councils which were statutory gas undertakers—viz., Cleator Moor, Egrement, and Frizington, and the object of the present application was to amalgamate these three undertakings into one and to enter into an agreement with the Workington Corporation for a supply of coke oven gas, which will come from a branch of the United Steel Companies which is situated in Workington. The parish of Moresby—which has been scheduled by the Whitehaven Company—is in the area of the new Ennerdale Rural District Council for general administrative purposes but not for the purpose of giving a gas supply, and the main carrying the supply of coke oven gas will pass through the eastern portion of Moresby. In the circumstances, the Ennerdale Rural District Council asked that Moresby should be included in its gas area, and this, in short, was the opposition to the two applications; the Whitehaven Gas Company opposed Moresby going into the gas area of the Ennerdale Rural District Council, and the latter opposed Moresby going into the area of the Whitehaven Gas Company.

The reasons given by the Whitehaven Company for having the parish of Moresby was that it followed a natural development of the extension of the Whitehaven mains which are close to the western portion of the parish, while the Ennerdale Rural District Council claimed Moresby because it is in the Rural District Council and should therefore be given a gas supply from the gas undertaking of the Rural District Council. At the same time it was agreed on both sides that there is no immediate prospect of a gas supply being demanded in this parish, and so remote is the possibility that neither party was able to give any estimate of the demand or when it would arise.

Not a Fruitful Area.

Mr. JACQUES ABADY, K.C., gave some interesting facts with regard to the Whitehaven Gas Company's undertaking. He said the area in general was not a very fruitful one. It was a distressed area, there was no industrial load, only a small commercial load such as for fish frying, and the domestic load showed a tendency to decrease, for the reason that as old houses, in which gas was used for lighting, were pulled down and the population accommodated in modern dwellings, provision was made in the latter for electric lighting, which reduced the gas load to that extent. Moreover, being largely a colliery district, the colliers received coal on very cheap terms and used that for cooking and heating. He said the average consumption of the ordinary consumer in the Whitehaven Gas Company's area was 35,000 cu.ft. per annum, and that the figure for slot meter consumers was 8,240 cu.ft. per annum. The average sale per mile of main was 2·4 million cu.ft. At the present time the charge for gas in the Whitehaven Company's area was a maximum of 5s. per 1,000 cu.ft., the gas having a calorific value of 470 B.Th.U., but it fell to 2s. 11d. per 1,000 cu.ft. according to consumption and in one case it was 2s. 9d. per 1,000 cu.ft. The equivalent therm price of 5s. per 1,000 cu.ft. was 12·8d. per therm. The slot meter consumers were charged an additional 6d. per 1,000 cu.ft. Under the Order, a maximum price of 15·2d. per therm was asked for, owing to a reduction having taken place in the receipts for residuals. For the purpose of arriving at the maximum price, an addition had been made to the present charge of 12·8d. per therm bringing it up to 13·2d. per therm to allow for the reduction in the receipts for residuals, and they were asking for a margin of 2d. per therm on that figure. In addition, it was asked that there should be a differential of 2d. per therm in respect of the outer area. At the present moment, a supply was being given in the Parish of Parton which was adjacent to Moresby, at the price being charged in Whitehaven—viz., 12·8d. per therm or 5s. per 1,000 cu.ft., and the Company, said Mr. Abady, would not be allowed to charge more than 14·8d. per therm in Moresby should this application be granted.

Mr. Abady then mentioned some of the facts in connexion with the Ennerdale Rural District Council's application, and said there was at present a maximum charge of 5s. per 1,000 cu.ft. for 435 B.Th.U. gas with other prices in various parts of the area of the Rural District Council, but he added that these were not economic prices because he was instructed that there was a considerable rate-in-aid to meet losses on the gas undertaking of the Rural District Council. At the same time he expressed the hope that the proposals which were contemplated for a supply of coke oven gas would enable the Ennerdale Rural District Council to get out of the difficulties which its predecessors had been in so far as the financial position of their individual undertakings was concerned.

Short of Storage.

Mr. *John Denham*, Engineer and Manager to the Whitehaven United Gas Company, gave evidence in support and said his Company now had modern showrooms and the capacity of the gas manufacturing plant was 240,000 cu.ft. per day, whereas the maximum day's output at present was 194,000 cu.ft. The Company was short of gas storage accommodation and had just concluded negotiations for a lease for 50 years of additional land for erecting a new gasholder.

In cross-examination he agreed that for some 10 years the Whitehaven Company had only paid 2½% on its capital and only 3% on the capital as reduced. He emphasized, however, that all extensions had been paid for out of revenue, and that, in the past, higher dividends had been paid.

The INSPECTOR, during this evidence, asked how a suggestion—he pointed out that he was not making it—that the western portion of Moresby should be given to the Company and the eastern portion to the Rural District Council would be received, the point being that the Company had its mains close to the western portion and the Rural District Council intended to lay its trunk main from Workington through the eastern portion.

Mr. *Denham* apparently viewed such a possibility with favour, and later in the proceedings Mr. Abady said that, if this was the view of the Inspector, he would make the necessary application.

Mr. ROYSTON ASKEW, for the Rural District Council, however, rather objected to this procedure and said there had been no evidence on behalf of the Company to justify what he referred to as an eleventh-hour application.

Later Mr. Royston Askew emphasized that while the maximum price asked for by the Rural District Council—and this would apply to Moresby—was 16d. per therm, the Whitehaven Company would be able to charge 17·2d. per therm in Moresby.

Evidence was given by Mr. George Evetts on behalf of the Ennerdale Rural District Council, and he told the Inspector that if he were entirely independent he would favour cutting the parish of Moresby in two and give the western portion to the Company and the eastern portion to the Rural District Council. He added that the authority which could supply cheapest would be the one which had the least overhead charges, and assuming the Rural District Council took the view that it should only charge such overhead charges as were directly attributable to the Moresby parish, and to take no account in that connexion of past losses in the three existing gas undertakings, it might well be that Ennerdale Rural District Council could supply more cheaply than the Whitehaven Company.

Mr. ABADY suggested that this would mean preferential charging, which the Rural District Council had no powers to do, but Mr. Evetts replied that if it could be shown the circumstances were different, charging on the basis he had suggested was permissible.

The Enquiry then closed.

Coal Complaint by Gas Consolidation, Ltd.

The North Staffordshire District Committee of Investigation, sitting in public at Stoke-on-Trent on Thursday and Friday, Jan. 26 and 27, heard two complaints made under the provisions of Section 5 of the Coal Mines Act, 1930, as amended by the Coal Act, 1938, by the Gas Consolidation, Ltd., on behalf of itself and its subsidiary Company, the Cannock District Gas Company, Ltd.

The complaints were as follow:

(*a*) With respect to the alleged refusal or neglect of the North Staffordshire District Sales Committee, or of such other persons as may be responsible for the operation of the North Staffordshire District (Coal Mines) Scheme, 1930, by sanction or consent to the sale of coal required by the complainants.

(*b*) With respect to the price being charged for the supply of Madeley Washed Fines owing to the operation of the North Staffordshire District (Coal Mines) Scheme, 1930.

The Tribunal comprised Mr. William Allen, K.C. (Chairman), Mr. Ashley Myott, Mr. E. A. Wright (Secretary of the North Staffordshire Colliery Owners' Association), and Mr. F. J. Hancock (Secretary of the North Stafford Miners' Federation), with the Secretary (Lieut.-Colonel J. G. Coulthred Thompson, D.S.O.).

Mr. H. Royston Askew (instructed by Mr. R. H. Studholme, London) appeared for the complainants, and Mr. Hartley Shawcross (instructed by Mr. J. G. Jones, Solicitor to the North Staffordshire Executive Board) represented the Sales Committee.

The first complaint made to the Investigation Committee alleged that though Madeley Collieries, Ltd., of Leycett, Stoke-on-Trent, were willing to supply the Cannock Gas Company with 2,000 tons of Madeley Washed Fines for early delivery to Cannock over a period of 12 months, they had been prevented from doing so by the Sales Committee. The required coal had special qualities which were not possessed in the same degree by other coals, and which were necessary for the proper operation of new carbonizing works recently constructed at Cannock at a cost of some £20,000. After much scientific research into the carbonization of different coals and blends of coals, those works were specially designed for the carbonization of a certain proportion of a coal having the special qualities of the required coal. It was alleged in the complaint that the Sales Committee, by preventing the supply of that coal, had compelled the undertakers to operate the works with coal of unsuitable quality.

Further submissions by the complainants to the tribunal were that the refusal of the Sales Committee was unfair and inequitable and was in breach of an assurance given by the Central Council of Colliery Owners to the Government.

Regarding the question of price, the respondents complained the Tamworth Subsidiary of Gas Consolidation, Ltd., had been charged 14s. 9d. for 1,000 to 1,500 tons of similar coal, whereas during the same period the Cannock subsidiary had been quoted 18s. 1d. a ton after the Sales Committee had undertaken to issue a consent for the supply of 1,500 of the required coal. It was submitted that the price of 18s. 1d. a ton was excessive.

Mr. ASKEW, in his address to the Investigation Committee, said the complainants regarded the price of 18s. 1d. a ton as wholly unjustifiable. After the complaint was sent in the Sales Committee quickly reduced the price to 16s. 1d. a ton. Two striking points were that the Madeley Collieries, Ltd., were able and willing to supply the coal to the Company; and, secondly, the injurious effect on public interest of the course of conduct pursued by those in authority under the Scheme. Madeley Collieries, Ltd., were prevented until the eleventh hour from selling the coal by the Sales Committee or others in authority under the Scheme.

Speaking of the activities of Gas Consolidated, Ltd., with its controlling interest in a dozen gas companies, Mr. Askew said the establishment of a coal testing station at Cannock and the result of the research work there in the blending of coals, represented a real advance in the technique and practice of the manufacture of gas for public purposes. It had been found that Madeley Washed Fines were most suitable for use in the plant.

Mr. Askew complained of long delays in dealing with the complainants' application for supply. It was obviously in the public interest that gas undertakings should be efficiently carried on, and that they should make use of modern developments and new methods. He alleged that the Sales Committee or Executive Board had tried to put difficulties in the way to prevent the complainants having the coal and by demanding a fantastic price. The reply of the Executive Board, he said, was that there was a contract for 16s. 1d. a ton accepted, and that therefore the matter was finished. They did not attempt to justify the price of 18s. 1d. a ton. The complainants asked the tribunal to direct the Sales Committee or Executive Board to say that the Cannock Company should be supplied with 2,000 tons at a price not exceeding 14s. 9d. a ton at pit.

Evidence was then given, some of the figures being revealed to the Committee in private.

Mr. *G. M. Gill*, Consulting Engineer to the complainants, gave evidence in support of the complaints.

Mr. *A. Atherton* (Director of Madeley Collieries, Ltd.) was also called by the complainants to give evidence regarding an interview with Mr. Gill in London. Witness said he regarded 16s. 1d. a ton as a fair price for the coal. He admitted to Mr. Askew that he had sold 5,200 tons of the same coal to a salt company at a price of 12s. 4d. a ton. He said that this was because it was necessary to retain the salt company as a customer to ensure getting rid of all the colliery company's output. It was recognized that the Gas Industry, with almost a monopoly, could afford to pay more for fuel. The position of his company was that a contract at 16s. 1d. a ton had been made for the sale of the coal, and that the price was a fair one.

Mr. *R. D. Wilkinson* (Secretary of the Sales Committee of the North Staffordshire Executive Board) was called for the respondents. He said each case was considered on its merits, and there was no question of a minimum price having been fixed for coal generally, or for grades of coal. The Tamworth Company had taken the coal over a long period and at a very low commencing price. Suitable advances were made in price as the contract was renewed, and the price had been earmarked for further increase at the next renewal.

In reply to Mr. Askew, witness said he still contended that it was fair and equitable that the Cannock Company should be asked a higher price than the Tamworth Company for the same fuel. The remedy was that the Tamworth price should be increased.

When the hearing was resumed on the second day, the evidence called for the respondents was heard *in camera*.

Mr. SHAWCROSS said even if everything the complainants had said were correct, it might be utterly deplorable and regrettable, but what was to be done about it. Regarding the complaint of a neglect to sanction the sale of Madeley Washed Fines, he contended the whole of that matter had gone. The Committee could not make any effective recommendation regarding that. The whole question was as to price raised on the second complaint. The price of 18s. 1d. might have been too high, but it was no longer subject to any effective recommendation there. The matter was "spilt milk." In his submission, the complainants had agreed to buy at 16s. 1d., so they had no ground of complaint. It did not matter that the Madeley Company were willing at one time to supply at 14s. 9d. a ton. The very object of the marketing scheme was to prevent the owners of particular collieries from undercutting. The objects of the Act were not to protect the interests of gas undertakings or to compel coal owners to sell at a lower price, but to protect the interests of the coal industry. Because the Act did not find favour with the consumers, it did not follow that it was not in the public interest. The object was to avoid the very evils which would have been exemplified by the sale of that coal at 14s. 9d. a ton. The object was to increase the profits of the industry so that decent conditions could be ensured. He pointed out that 86% of the profits went to the men, and 14% to the owners; but in the last few years the owners in North Staffordshire had foregone over £1,000,000 of that 14%, and the miners of the district had not yet got the 2s. increase they were promised two years ago. Obviously, the prices must go up in those markets where they could be raised.

Mr. ASKEW, replying for the complainants, said no explanation had been given why the 2,000 tons asked for had been arbitrarily reduced to 1,500 tons. Mr. Shawcross's contention on the question of price seemed to be that the only consideration was that the owners should have more money. The only method of redress open to the complainants was to appeal to the Investigation Committee.

The Tribunal retired, and the Chairman then announced that the Committee felt they could not give an immediate decision. They were anxious, however, that the Cannock Company should not be prejudiced by not being able to get any of the coal in the meantime. Mr. Wright had made a suggestion which the Committee thought exceedingly fair—namely, that, pending a decision, the Executive Board allow the Gas Company to have all the coal they wanted, the coal to be supplied and the price to be paid for it being that which the tribunal ultimately said was correct. The Gas Company would accept the coal on those terms, subject, of course, to any rights of appeal.

Mr. SHAWCROSS said it would have to be quite without prejudice to the point that the Committee could compel a colliery to sell at a price they fixed.

The CHAIRMAN said it was without prejudice on any point.

Scottish Junior Gas Association

(Eastern District)

The Eastern District of the Scottish Junior Gas Association held a "Short Paper" Meeting at Dunfermline on Jan. 7, when four contributions were presented. We deal this week with three of these.

Short Paper Day at Dunfermline

THE RECOVERY OF CRUDE BENZOLE FROM VERTICAL RETORT GAS.

By F. B. WALLER,
of Alloa.

I propose to confine my remarks, as the title indicates, to the stripping of coal gas manufactured in continuous vertical retorts by the gas oil washing process and subsequent recovery of crude benzole and naphtha by distillation as carried out at Alloa.

The gas is stripped in a "Stator" type washer having six compartments complete with a series of oil circulating pumps, one for each washing compartment, which continually recirculate the oil in each compartment at a high rate so that the oil is re-circulated many times before ultimately leaving the washer. The high rate of re-circulation ensures maximum concentration of the benzole in the oil, allowing lower oil circulation through the recovery plant with subsequent economy in steam and water consumption per gallon of benzole extracted.

Little supervision is necessary for the efficient working of the plant other than daily attention to the oiling of the steam engine, greasing of bearings, &c., and the periodic drainage of sludge and water from the bottom of each compartment. The correct level of the oil in the washer can be automatically maintained.

As for the debenzolizing plant, this is free from any attendant troubles, other than the daily noting of temperatures and adjustment if necessary.

Effect of the Removal of Benzole from Coal Gas.

(1).—*Naphthalene and Sulphur Removal.*—It has been found that it is possible to extract the bulk of the naphthalene from the gas during the process of washing for benzole with gas oil, the naphthalene removed is recovered at the debenzolizing still in the wash oil residues refluxed from the dephlegmator.

One of the beneficial results attendant upon benzole recovery is the reduction of the sulphur content of the gas which takes place due to the extraction by the wash oil from the gas of a portion of the carbon disulphide, thiopene, and mercaptans. Prior to the commencement of benzole recovery at Alloa the sulphur present in the purified gas was approximately 10 grains per 100 cu.ft. (in itself a very low figure), but oil washing immediately brought about a 40% reduction, equal to 4 grains per 100 cu.ft.

The absorption by the oil of any appreciable amount of sulphur compounds will, of course, result in a high content of sulphur in the crude benzole, which in the proposed new method of valuation of crude benzole by the National Benzole Association will have the effect of reducing its selling value.

The amount of total sulphur in the crude benzole at Alloa is, however, only 0·24% by weight and comes within the permissible limits.

(2) *Reduction in Volume.*—Since the benzole in the gas occupies a certain volume as a vapour its removal causes a decrease in the volume of the gas; one gallon of crude benzole is equal approximately to 40 cu.ft.

(3) *Reduction in Calorific Value.*—The calorific value of benzole is approximately 4,000 B.Th.U. per cu.ft., hence its removal will cause an appreciable reduction in the calorific value of the gas, which is equal to 1·6 therms per gallon of benzole extracted. The extraction of 2 gallons of benzole will account for the following reduction in thermal yield, taking into account the reduction due to reduced steaming to manufacture the higher quality gas:

(*a*) Gas made per ton of coal without benzole extraction	18,000 cu.ft., 79·2 therms
(*b*) Benzole to be extracted from gas per ton of coal ..	2 gall.
(*c*) B.Th.U. to be extracted from gas per ton of coal ..	16·5
(*d*) Therefore calorific value of gas required to be made	456·5
(*e*) Estimated thermal yield per ton of coal due to reduction of use of steam in retorts	72·4
(*f*) Reduced therms per ton of coal by benzole extracted	3·2
(*g*) Net thermal yield per ton of coal after extraction of benzole	69·2

(4) *Alteration in Composition of Gas.*—According to Whitehead,[2] a gas from which the benzole has been recovered is much more constant in quality than a rich gas owing to its being less liable to condensation in the gas mains. As a result of war time experience, it has been stated that the removal of the light oils from the gas causes the "drying" or "hardening" of the meter leathers, and as pointed out by Firth[3] this condition of the meter leathers is caused by the drainage of the oil dressing from the leathers, due to the reduced viscosity of the oil brought about by the absorption of the light oils from the gas. Hence benzole recovery is more likely to prevent this condition than produce it.

Experience in Alloa since acquiring an adjoining gas undertaking bears out this statement, and in Alloa alone, out of a recent lot of 84 meters dismantled, only four sets of meter leathers were required to be renewed due to "hardening."

Another argument that has been frequently brought against benzole recovery is that the process is responsible for an increase in corrosion troubles and in the deposits found in gas mains and meters. Corrosion troubles can be eliminated or considerably reduced by the drying of the gas, and the advantages of gas dehydration have been fully appreciated by gas engineers. The gums formed in the presence of nitric oxide that cause trouble in meters are brought about by the oxidation and polymerization of the unsaturated hydrocarbons present in the gas, and the removal of a considerable proportion of these constituents with the benzole should reduce rather than increase trouble due to this cause.

In view, therefore, of the reduction of the naphthalene, sulphur compounds, and unsaturated hydrocarbons in the gas, brought about by benzole recovery, it is extremely doubtful whether this process has any adverse effect on mains and meters.

I now wish to illustrate by means of the following balance sheet how a substantial increased revenue can be obtained by the extraction of 2 gallons of benzole per ton of coal carbonized in continuous vertical retorts, the figures being based on the practical results obtained at Alloa.

Gas is supplied to the district at a declared calorific value of 440 B.Th.U. per cu.ft. In order to extract 2 gallons of benzole it is necessary to manufacture a gas of 456·5 B.Th.U.

The coke produced is increased by the corresponding extra coal carbonized and also by the reduction in steaming necessary in the retorts to make the higher quality gas.

The total quantities of tar and ammoniacal liquor are relatively increased by the extra coal carbonized.

On the debit side we have the cost of the extra coal with accompanying cost of handling into hoppers, purification

[1] Motor Benzole.

[2] Benzole, p. 13.

[3] Firth, F. "GAS JOURNAL," 1929, 188-595.

charges on extra therms of gas made, working costs of benzole recovery, and capital charges on the benzole plant.

Comparison of Working of a Gas-Works Making 1,500,000 Therms per Annum With and Without Benzole Recovery.

No Benzole Recovery.	£
Coal carbonized—19,000 tons at 21s.	19,950
Revenue from residual products—Tar: 1,615 tons at 40s. net	3,230
S/Ammonia: 297 tons at 40s. net	594
	£3,824
Cost of coal, *less* residuals—Tar and sulphate only	£16,126
Revenue from saleable coke—7,600 tons at 22s. net	8,360
Net cost of coal, *less* residuals	7,766
Percentage return on cost of coal	61

With Benzole Recovery.	£
Coal carbonized—21,739 tons at 21s.	22,826
Add cost of handling extra coal—2,739 tons at 3d.	34
Extra purification costs—2,739 tons at 4d. per ton	46
Capital charges on plant—10% on £2,000	200
	£23,106
Revenue from residual products—Tar: 1,848 tons at 40s. net	£3,696
S/Ammonia: 340 tons at 40s. net	680
Benzole and naphtha: 43,478 gall. at 10d. net	1,812
	£6,188
Cost of coal, *less* residuals—Tar, sulphate, and benzole	£16,918
Revenue from saleable coke—9,239 tons at 22s. net	10,163
Net cost of coal, *less* residuals	6,755
Percentage return on cost of coal	71
Net extra revenue per gallon of benzole products	5·58d.

From this data it can be seen that the net cost of coal is considerably lowered by benzole recovery. The additional coke made accounts for a large proportion of the extra revenue from residual products with benzole recovery, and it has been put forward that the surplus coke may be difficult to market as regards disposal and price. In certain circumstances this may be true, but should present no real difficulty.

A potential gas consumer of 65,000 therms per annum at an industrial rate of 4·0d. per therm would yield a gross income of £1,083 also with a resultant increase in coke production, and this selling price of gas is undoubtedly economic. I think that one is entitled to consider the recovery of benzole extraction as an all-the-year-round consumer and one that can be shut off at will, without any distribution problems or bad debts.

Briefly summarized, the main points I wish to bring out showing the merits of benzole recovery are as follows:

1. Benzole recovery from coal gas is a sound revenue-producing proposition when the gas is manufactured in continuous vertical retorts.

2. A regular quality of gas is supplied with a reduction in sulphur compounds and naphthalene.

3. A better quality of coke as a smokeless fuel is produced due to reduced steaming in the retorts.

4. The Gas Industry is playing its part in providing this country with a home produced motor spirit and helping to solve the unemployed problem in the coalfields.

Benzole Recovery Plant—Alloa Gas-Works.

Annual Cost Sheet, 1937.

Production—	£	s.	d.
Benzole made 26,366 gall. at 12·30d./gall.	1,351	15	1
Naphtha made 8,593 „ „ 7·50d. „	268	10	7
Spent oil sold 1,500 „ „ 2·50d. „	15	12	6
Total revenue	£1,635	18	2
Average price received per gall. of products =	11·23d.		
Working costs—	£	s.	d.
Water used 2,100,000 gall. at 2d. per 1,000 gall. (60 gall. per gall. of benzole)	17	10	0
Steam consumption—50 lb. per gall. of benzole met by waste heat boiler in carbonizing plant at 6d. per 1,000 lb.	48	14	0
Wash oil used—3,062 gall. at 5¼d. per gall. (1 gall. per 11 gall. benzole)	70	3	5
Repairs and maintenance—Supervision, oil, &c.	28	10	0
Total working costs	£164	17	5
Average revenue per gall. products =	11·23d.		
Working costs „ „ „ =	1·13d.		
Net revenue per gall. of products =	10·10d.		

"ALL IS NOT GOLD THAT GLITTERS."

AN ARGUMENT NOT IN FAVOUR OF BENZOLE EXTRACTION.

By W. NICOL BAIRD, B.Sc., M.Inst.F., A.M.I.Mech.E., Assoc.M.Inst.Gas E.,

Deputy Engineer and Manager, Dunfermline Corporation Gas Department.

Enthusiasm for any cause leads to what the psychologists call a "complex." We have already witnessed in our time the exaggerated limits to which the "electrical complex" has carried everything before it, and I think everyone here at least knows, or has heard of, some of the colossal misapprehensions which have been foisted on our long suffering and easily misled public from this same unfortunate source.

The case of benzole extraction is a similar plague, the ramifications of which will be realized unfortunately only too late.

The greatest argument for benzole is generally put in the form of the question: "If you had the chance of a customer for the equivalent amount of extra gas, would you refuse it at so remunerative a prospect? Would you? Of course not! Neither would I!

But address the same question to every undertaking and you arrive at the anomalous position that individually their answers are sound but collectively they are heading for commercial suicide in both the coke and the tar markets!

In certain circumstances it is not only practicable but it is or would be beyond question a very economic procedure to adopt extraction. When an undertaking declares a definite C.V. but sells at a higher figure because it is unable to get down to the declared level of quality all the time (as may happen, for example, in the case of the static type of carbonizing plant without steaming) then it *is* a golden opportunity to commercialize losses by extraction. The result of this means merely that something is being taken from the consumers for which they are not paying.

In the case of undertakings mixing straight gas with water gas there is also a great deal to be said for reducing the C.V. by extraction instead of dilution, in view of the more stable characteristics of the resultant gas.

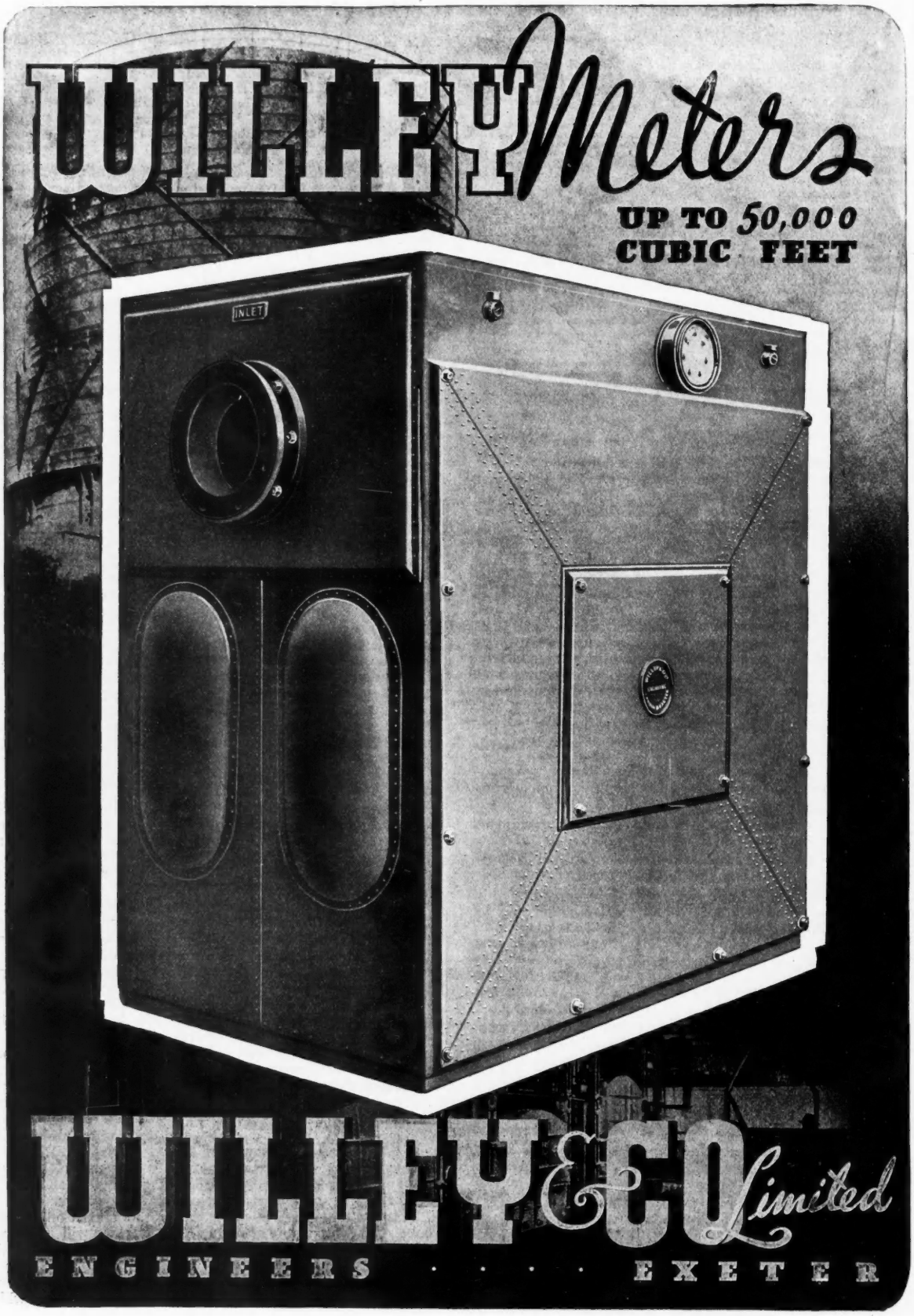
In any other case, especially where verticals are employed, the extraction of benzole cannot avoid an increase in the production of coke and tar, and the more benzole extracted, the more coke and tar will be available for sale.

The solution is to develop the market first and then increase production to meet it. The present tactics, which we are asked to support, are on a par with the church which spends money on improvements and then appeals for funds to clear its debt! Of course, the proper method, like all true progress, is very slow and it is usually difficult to raise or maintain a great deal of enthusiasm when results are so far in the future.

Again, I would emphasize that the trouble is further accentuated by the wholesale conversion of numerous undertakings to the one idea simultaneously, and there would never have been an amendment nor even a whisper of criticism raised to-day if the adoption of benzole extraction had developed at the same rate of improvement as the state of the coke market.

The "Gas Journal" for Dec. 14 last devoted a good deal of its space to proving that if the coke were sold at 5s. 4d. per ton, the plant would pay for itself. Surely the whole point of the argument was missed in such a statement. If the extra thousands of tons of coke were sold at any such reduced price what would happen to the price of the main body of coke that was left? If it was not reduced accordingly it would still be in stock, and, take note, to-day there are hundreds of thousands of tons in stock already. Examine the net profit from benzole in any undertaking and see how much profit would be left if the total production of coke declined in value by, say, one shilling per ton.

It is not a question of the extra coke alone but of the total coke. If there is any profit left, it certainly will be microscopic, and yet there are some who will be sure to justify benzole extraction by finding other reasons for the drop in price of coke in spite of the fact that thousands of tons are being lost to-day by overproduction and large stocks which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are depreciating by exposure and which will reach lower levels of value with future handling.

The new financial year will commence with large stocks in hand, when already all available storage place is being utilized. Some may be of the opinion that the water gas plants will then come into their own. That may be so, no doubt, and they will produce gas in the region of 5d. per 1,000 cu.ft. dearer than the main plant, disturb the characteristics of the present gas, and reduce the coal consumption in the retorts, with a consequent reduction in the revenue from benzole. A nice vicious circle which will no doubt find a balance somewhere, *but not in the bank*!

What is the position of my more conservative brethren who have not yet seen the advantages of adopting the benzole complex? The price of coke will fall in their case as well and they will not be recouped even partially by income from benzole as in the case of the others, and consequently they may be more easily persuaded to resort to benzole production in order to face the situation created by the new state of affairs.

When this does eventualize the crest of the wave of chaos will be reached, and then an advance may be made to expand our coke market, and I have no doubt the expansion will be greatly assisted by the then cheap price of the fuel—much to the benefit of the smoke abatement or abolishment enthusiasts. As surely, however, as sudden attack can bring out sudden defence, one hope does arise, and that is, a general reduction in the declared C.V. This seems to be the only logical sequel which could meet the present situation and the consequent flood of coke that is gradually gaining head.

One of the striking features on looking over a number of balance sheets is the lack of unanimity in quantities of water and steam required in the actual extraction process, and generally there are one or two important omissions in one balance sheet which appear in another, and certain factors do not appear to be taken into consideration at all. This gives rise to a variety of statements of profits which range from 4d. to 7d. per gallon of benzole extracted. Actually, in the one case I have already mentioned where no extra coal is carbonized and no extra coke put on the market the profits may be as high as 9d. per gallon, but in the case of continuous vertical retorts even the lower figure of 4d. will probably be found in reality to be an overestimate because of certain factors which are not at first apparent.

I have worked out the position we should be in at Dunfermline by installing benzole plant, and I feel that those results are representative of other works, although there will be several minor factors which will vary. Estimates are bound to vary from actualities when one finds such a divergence in figures of, for instance, one undertaking giving steam consumption as low as 11·7 lb. per gallon, while another gives 77 lb. per gallon. In this case I have taken the figures of 60 lb. per gallon, which approximates more closely to the majority of estimates.

Again, seldom is the cost of handling the extra coal taken into consideration. In smaller undertakings it is possible to divide, say, some 2,000 tons by 365 days and say that since that is only one wagon per day the cost of handling will be nothing. Well, I admit it does sound almost reasonable, but really it will be costing 1½d. per ton or thereabouts, and the fact that there is to be handled 2,000 or 20,000 tons according to the size of the undertaking will not alter the persistency of this cost. Of course, if men are standing by idle part of the day there will only be the additional wear and tear of plant with which to contend. In any case, the argument that the handling of the extra coal would cost nothing appears to me to be as futile as the argument that people with a coal fire and a back boiler are getting their hot water for nothing.

The cost of handling coke is a much heavier item in proportion to tonnage. It will be found to be in the region of 1s. 1d. per ton due to its greater abrasive nature, the amount of manhandling into bags and the cost of grading.

The maintenance of conveyors, chutes, bogies, &c., may be put down very conservatively at 3d. per ton.

Cooling water varies considerably in individual undertakings because of private wells or suitable river water at hand. In our case we would be obliged to pay 6d. per thousand gallons.

I have not noticed anyone take into consideration the additional cost of handling producer fuel and producer ashes. It is relatively rather a minor item, but we have been trained to remember that it is the pennies which count and the pounds which will look after themselves.

Purification costs will also be raised. This is another small item which, however, is offset by the improved reduction of the sulphur content of the gas.

A nominal sum has been put down against oncosts. Any plant should be able to bear its proportion of these at all times.

On the credit side, then, we have benzole, naphtha, coke, tar, and ammonia and reduced steaming, which in our case leaves an apparent profit in the revenue account of £815 on the understanding that coke and tar maintain their present level of prices.

Of course the same argument applies to tar as to coke. The greater production will surely tend to depreciate its

Benzole Recovery Data.

1. Gas made per annum, cu.ft.	435,007,000
2. Gas made per ton of coal carbonized, cu.ft.	18,306·76
3. Coal carbonized per annum, tons	23,762
4. Calorific value, B.Th.U./cu.ft.	430
5. Therms per ton of coal carbonized	78·72
6. Total therms per annum	1,870,530
7. Extraction per ton of coal, gall.	1
8. B.Th.U. extraction per cu.ft.	7
9. Increased C.V. required	437
10. Reduced thermal yield due to reduction in steaming (from West's Steaming Curves)	75·72
11. Therms extracted per ton of coal	1·6
12. Net thermal yield after extraction	74·12
13. Gas make per ton of coal with extraction	17,237·2
14. Total coal to be carbonized, tons	25,236
15. Additional coal to be carbonized, tons	1,474
16. Increased coke due to additional coal at 9 cwt./ton	663
17. Increased coke due to reduced steaming, cwt./ton	0·21
18. Total coke due to reduced steaming, tons	265
19. Gross total increased coke, tons	928
20. Cost of additional coal at 20s. 8d. per ton	£1,523
21. Revenue from additional coke at 25s. per ton	£1,160
22. Cost of handling additional coal at 1½d. per ton	£9
23. Cost of handling additional coke at 1s. 1d. per ton	£50
24. Additional maintenance on retorts at 11d. per ton	£68
25. Labour on benzole plant at ¼d. per gall.	£26
26. Additional maintenance on handling plant, screens, conveyors, chutes, tippers, winches, hoppers, &c. Coal 1,474 + coke 928 = 2,402 tons at 3d. per ton	£30
27. Cooling water, 55 gall./gall. benzole, 6d. per 1,000 gall.	£34
28. Reduced steaming	0·8%
29. Reduced steaming, lb. (approx.)	135,000
30. Value of reduced steaming at 1s. 3d. per 1,000 lb.	£8
31. Cost of steam required for benzole plant, 60 lb./gall.	£95
32. Increased tar yield, 18·5 gall./ton, gall.	27,269
33. Value of increased tar yield at 2d./gall.	£227
34. Total benzole production, gall.	25,236
35. Total naphtha produced, gall.	2,524
36. Revenue from benzole at 11d./gall.	£1,157
37. Revenue from naphtha at 6d./gall.	£63
38. Oil replacement, 0·01 gall./gall. benzole at 9d./gall.	£9
39. Increase in producer fuel, 14% of 1,474 tons, tons	206
40. Increase in ashes, 15% of 206 tons, tons	30
41. Cost of handling 206 + 30 tons at 3d. per ton	£3
42. Additional purification cost, 0·06d./gall. of benzole	£6
43. Oncosts: Laboratory tests, supervision, records, orders, telephones, tank tickets, &c., holidays with pay, insurance, superannuation, &c.	£32
44. Additional revenue from concentrated ammonia	£8
45. Capital cost of plant	£3,000
46. Repayment of capital at 5% depreciation for 20 years	£150
47. Interest on borrowed capital at 3½% per annum: 1st year £105 to 20th year £5 5s., average	£55 10s.

Benzole Production—Estimated Revenue Account.

DEBIT.	£	CREDIT.	£
To 1,474 tons extra coal at 20s. 8d. per ton	1,523	From Benzole	1,157
Handling ditto at 1½d. per ton	9	Naphtha	63
Handling extra coke at 1s. 1d. per ton	50	928 tons extra coke at 25s. per ton	1,160
Labour at ¼d. per gall.	26	Extra tar at 2d. per gall.	227
Maintenance on handling plant at 3d. per ton	30	Ammonia	8
Cooling water—55 gall. per gall. benzole, at 6d. per 1,000 gall.	34	Reduced steaming	8
Extra steam—60 lb. per gall. benzole at 1s. 3d. per 1,000 lb.	95	Oil make up to benzole	9
Cost of handling extra producer fuel	3		
Additional purification cost	6		
Oncosts	32		
Oil make up	9		
Gross profit	815		
	£2,632		£2,632

Estimated Net Revenue Account.

	£	s.	d.		£	s.	d.
To redemption of advances—5% of £3,000	150	0	0	From balance brought forward from revenue account	815	0	0
Interest at 3½%—1st year, £105 20th year, £5 5s. Average	55	10	0				
Retort repair account	68	0	0				
Net profit	541	10	0				
	£815	0	0		£815	0	0

value—a value which at the present time is being bolstered up solely by the strenuous efforts of the tar association.

From this net revenue balance-sheet there has to be deducted appropriate sums for interest and repayment of capital, and a proportion towards retort repair reserve fund. Every healthy undertaking provides a reserve fund for retort maintenance, and this works out at about 11d. per ton of coal carbonized, and naturally if you carbonize more coal you are wearing out the plant, whether gas or benzole is being produced.

It has been remarked that the reduced steaming would cancel this cost, but nowhere have I been able to find any authoritative statement which says that retort depreciation was in proportion to the amount of the steaming, and contractors in any case take up this work on a price per coal throughput basis irrespective of steaming or quality.

With regard to the loan interest, I have allowed for the fact that money is cheap to-day and we are able to borrow at 3½% for the 20 years. This makes the first charge one of £105, while the 20th would only be £5 5s. To obviate this variance, I have taken the average charge over the whole period of twenty years—viz., £55 10s. This then leaves a net annual profit of £541 10s. Certain modifications of this sum, however, will be made by local rates, but as these are rather involved over the period of twenty years, I have not been able to set them down here, in this short Paper.

Taking our total saleable coke at 12,000 tons (including the additional quantity due to the extraction of benzole), and allowing for the small drop in price of 1s. per ton, you will appreciate that our income would then be reduced by the sum of £600.

So, our apparently reasonable profit of some £540 not only completely vanishes, but becomes a definite loss by the fractional depreciation in the current average price for coke. Any further fall in the price of coke or of tar would turn the scale of a fractional loss into quite a serious affair.

You will note that the estimate which I am appending herewith is made on the assumption that only one gallon of benzole is extracted per ton. Increased extraction, of course, will increase production of coke and tar correspondingly. For 1½ gallons extraction 1,500 tons of additional coke would be on our hands, and with 2 gallons per ton extracted some 2,000 tons would then be available. For all of which amount a local market could not at present be found, as we are already dependent on foreign markets to absorb about 40% of our present production.

The question has also been raised that extraction should be looked upon as a national service. No business, however, could exist if it were run for purely patriotic principles, and the fact that the Gas Industry has helped to shoulder the burden accumulated by the misguided patriotism lavished on the electrical industry is no precedent that our industry should be crucified now or at any time on the altar of benzole extraction.

GRADING TABLE.

By W. MASTERTON,

of Edinburgh.

Since I strongly object to doing the same calculation many times over and as one who regards calculations after routine experimental results have been obtained as an unnecessary irritation, I have designed this table to eliminate the calculations associated with the screen analysis of coke.

In the conditions prevailing on the small experimental plant at Granton it is necessary to screen samples of coke which may vary from about 45 to 60 lb. in weight.

Once the screen analysis is completed the various fractions have to be calculated to a percentage basis. This table gives the percentage of each fraction at a glance.

As an example, suppose a sample weighed 57 lb. and the fractions were as follows:

On 2½ in. sieve	29 lb. ..	50·9%
„ 2 „ „	8 „ ..	14·0 „
„ 1½ „ „	10 „ ..	17·5 „
„ 1 „ „	5 „ ..	8·8 „
„ ½ „ „	2 „ ..	3·5 „
Residue	3 „ ..	5·3 „
	57 lb.	100·0

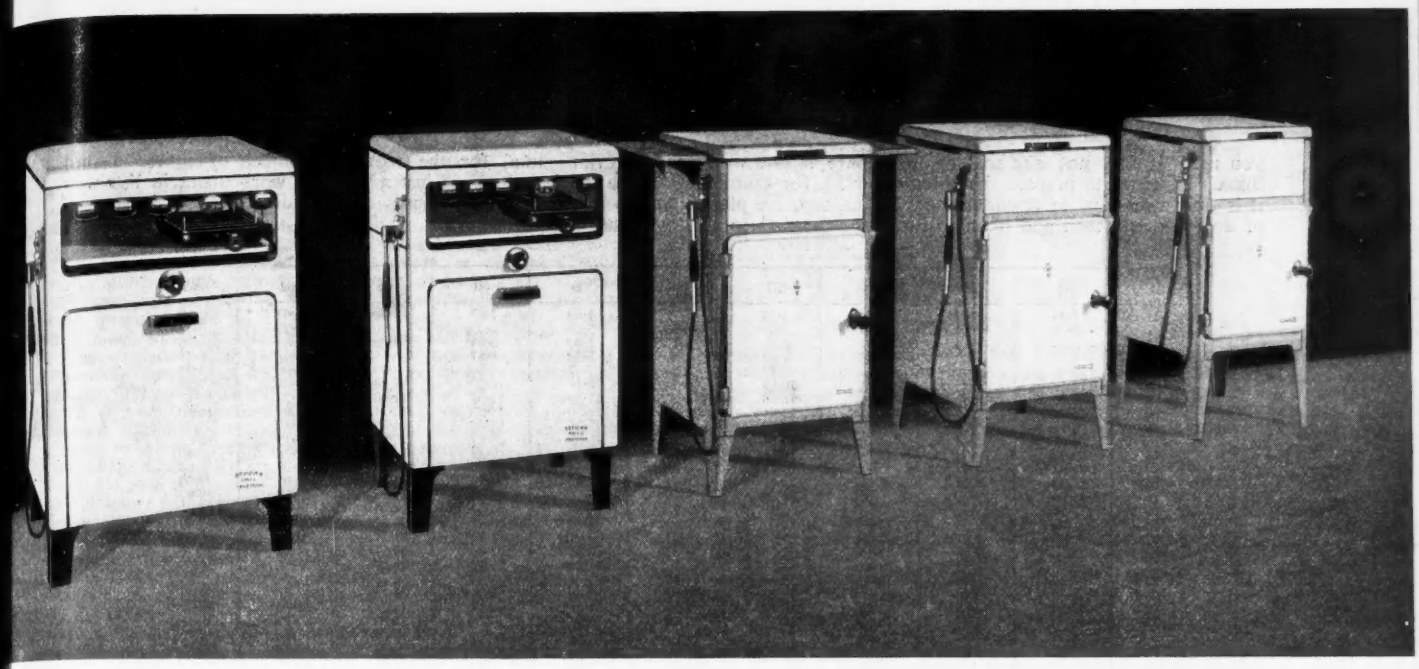
Referring to column headed "57" we can take out the results directly, viz., 50·88, 14·04, 17·54, 8·77, 3·51, and 5·26. These results are rounded off to the first place of decimals, giving the percentages shown above.

It is necessary to have the figures in the table expressed to two places of decimals, because the total of all screening fractions worked out to the first place does not necessarily come to 100·0. In the event of this total coming to, say, 99·9 it is desirable to know the figures to the second place so that the adjustment to 100·0 can be made on the correct screen fraction of the coke.

It will be observed that certain of the figures are marked with a minus (−) sign, *e.g.*, under 55 lb. "sample" and 8 lb. "fraction" the figure is 14·55−. This is because 8 × 100 ÷ 55 = 14·5 '45'. If this is expressed to one place it is 14·5; if to two places 14·55. If this latter figure is now expressed to one place this is 14·6, which is wrong. This occasion arises only when the digits in second and third places are 45-49 inclusive. When the user of this table reads 14·55 − he will therefore record 14·5 as the reading correct to the first place.

In conclusion, I would pass this table on to you with the suggestion that if the sample range (44-63 lb.) covered in it does not fulfil your requirements, it will be worth your while to prepare one for yourself which does cover the range

	44	45	46	47	48	49	50	51	52	53
1	2·27	2·22	2·17	2·13	2·08	2·04	2·00	1·96	1·92	1·89
2	4·55−	4·44	4·35−	4·26	4·17	4·08	4·00	3·92	3·85−	3·77
3	6·82	6·67	6·52	6·38	6·25	6·12	6·00	5·88	5·77	5·66
4	9·09	8·89	8·70	8·51	8·33	8·16	8·00	7·84	7·69	7·55−
5	11·36	11·11	10·87	10·64	10·42	10·20	10·00	9·80	9·62	9·43
6	13·64	13·33	13·04	12·77	12·50	12·24	12·00	11·76	11·54	11·32
7	15·91	15·56	15·22	14·89	14·58	14·29	14·00	13·73	13·46	13·21
8	18·18	17·78	17·39	17·02	16·67	16·33	16·00	15·69	15·38	15·09
9	20·45	20·00	19·57	19·15−	18·75	18·37	18·00	17·65−	17·31	16·98
10	22·73	22·22	21·74	21·28	20·83	20·41	20·00	19·61	19·23	18·87
11	25·00	24·44	23·91	23·40	22·92	22·45−	22·00	21·57	21·15	20·75
12	27·27	26·67	26·09	25·53	25·00	24·49	24·00	23·53	23·08	22·64
13	29·55−	28·89	28·26	27·66	27·08	26·53	26·00	25·49	25·00	24·53
14	31·82	31·11	30·43	29·79	29·17	28·57	28·00	27·45	26·92	26·42
15	34·09	33·33	32·61	31·91	31·25	30·61	30·00	29·41	28·85−	28·30
16	36·36	35·56	34·78	34·04	33·33	32·65	32·00	31·37	30·77	30·19
17	38·64	37·78	36·96	36·17	35·42	34·69	34·00	33·33	32·69	32·08
18	40·91	40·00	39·13	38·30	37·50	36·73	36·00	35·29	34·62	33·96
19	43·18	42·22	41·30	40·43	39·58	38·78	38·00	37·25	36·54	35·85−
20	45·45	44·44	43·48	42·55	41·67	40·82	40·00	39·22	38·46	37·74
21	47·73	46·67	45·65	44·68	43·75	42·86	42·00	41·18	40·38	39·62
22	50·00	48·89	47·83	46·81	45·83	44·90	44·00	43·14	42·31	41·51
23	52·27	51·11	50·00	48·94	47·92	46·94	46·00	45·10	44·23	43·40
24	54·55−	53·33	52·17	51·06	50·00	48·98	48·00	47·06	46·15	45·28
25	56·82	55·56	54·35−	53·19	52·08	51·02	50·00	49·02	48·08	47·17
26	59·09	57·78	56·52	55·32	54·17	53·06	52·00	50·98	50·00	49·06
27	61·36	60·00	58·70	57·45−	56·25−	55·10	54·00	52·94	51·92	50·94
28	63·64	62·22	60·87	59·57	58·33	57·14	56·00	54·90	53·85−	52·83
29	65·91	64·44	63·04	61·70	60·42	59·18	58·00	56·86	55·77	54·72
30	68·18	66·67	65·22	63·83	62·50	61·22	60·00	58·82	57·69	56·60
31	70·45	68·89	67·39	65·96	64·58	63·27	62·00	60·78	59·62	58·49



STANDARDIZATION

by

PARKINSON

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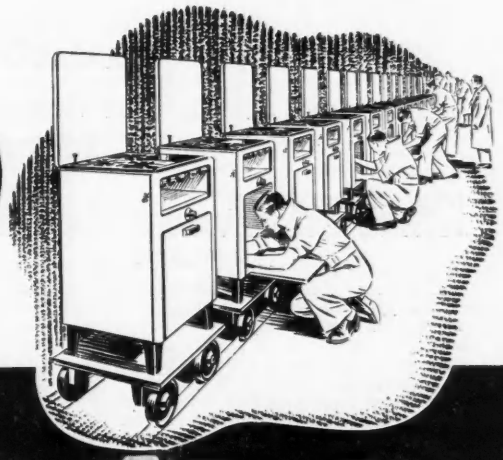

THE PARKINSON STOVE COMPANY, LTD., BIRMINGHAM 9. London Showrooms: Terminal House, Grosvenor Gardens, S.W.1.

you use. It does not take so long to prepare as one would think. In order to prepare the column for 57, for example, it is only necessary to divide 100 by 57, to, say, six places of decimals and then add it on to itself and then on to the previous total for the required number of times. I find the whole column is just as quickly worked out in this way as the six separate results of a grading analysis in the ordinary way.

	54	55	56	57	58	59	60	61	62	63
1	1·85	1·82	1·79	1·75	1·72	1·69	1·67	1·64	1·61	1·59
2	3·70	3·64	3·57	3·51	3·45—	3·39	3·33	3·28	3·23	3·17
3	5·56	5·45	5·36	5·26	5·17	5·08	5·00	4·92	4·84	4·76
4	7·41	7·27	7·14	7·02	6·90	6·78	6·67	6·56	6·45	6·35—
5	9·26	9·09	8·93	8·77	8·62	8·47	8·33	8·20	8·06	7·94
6	11·11	10·91	10·71	10·53	10·34	10·17	10·00	9·84	9·68	9·52
7	12·96	12·73	12·50	12·28	12·07	11·86	11·67	11·48	11·29	11·11
8	14·81	14·55—	14·29	14·04	13·79	13·56	13·33	13·11	12·90	12·70
9	16·67	16·36	16·07	15·79	15·52	15·25	15·00	14·75	14·52	14·29
10	18·52	18·18	17·86	17·54	17·24	16·95—	16·67	16·39	16·13	15·87
11	20·37	20·00	19·64	19·30	18·97	18·64	18·33	18·03	17·74	17·46
12	22·22	21·82	21·43	21·05	20·69	20·34	20·00	19·67	19·35	19·05—
13	24·07	23·64	23·21	22·81	22·41	22·03	21·67	21·31	20·97	20·63
14	25·93	25·45	25·00	24·56	24·14	23·73	23·33	22·95	22·58	22·22
15	27·78	27·27	26·79	26·32	25·86	25·42	25·00	24·59	24·19	23·81
16	29·63	29·09	28·57	28·07	27·59	27·12	26·67	26·23	25·81	25·40
17	31·48	30·91	30·36	29·82	29·31	28·81	28·33	27·87	27·42	26·98
18	33·33	32·73	32·14	31·58	31·03	30·51	30·00	29·51	29·03	28·57
19	35·19	34·55—	33·93	33·33	32·76	32·20	31·67	31·15—	30·65—	30·16
20	37·04	36·36	35·71	35·09	34·48	33·90	33·33	32·79	32·26	31·75—
21	38·89	38·18	37·50	36·84	36·21	35·59	35·00	34·43	33·87	33·33
22	40·74	40·00	39·29	38·60	37·93	37·29	36·67	36·07	35·48	34·92
23	42·59	41·81	41·07	40·35	39·66	38·98	38·33	37·70	37·10	36·51
24	44·44	43·64	42·86	42·11	41·38	40·68	40·00	39·34	38·71	38·10
25	46·30	45·45	44·64	43·86	43·10	42·37	41·67	40·98	40·32	39·68
26	48·15	47·27	46·43	45·61	44·83	44·07	43·33	42·62	41·94	41·27
27	50·00	49·09	48·21	47·37	46·55	45·76	45·00	44·26	43·55—	42·86
28	51·85	50·91	50·00	49·12	48·28	47·46	46·67	45·90	45·16	44·44
29	53·70	52·73	51·79	50·88	50·00	49·15	48·33	47·54	46·77	46·03
30	55·56	54·55—	53·57	52·63	51·72	50·85—	50·00	49·18	48·39	47·62
31	57·41	56·36	55·36	54·39	53·45—	52·54	51·67	50·82	50·00	49·21

French Gas Industry

Review of the 61st Congress of the Union Syndicale de l'Industrie Technique du Gaz en France

NEW SUPPLE AND SLIDING ASSEMBLANCE SYSTEMS FOR GATE VALVES AND SUBTERRANEAN MAINS.

E. Berriat described three new types of mains fittings which provide supple and sliding joints and minimize the effects of soil movements and of temperature fluctuations. In addition, the resulting flexibility of the systems described enables valves, &c., to be fitted or withdrawn without difficulties due to faulty alignment.

The devices in question are patented and are associated with the trade-names Perflex, Isoflex, and Metastandard.

The Perflex system provides for the floating assemblage of a valve by means of special collars characterized by a conoidal form. In connexion with it, use is made of rubber gaskets.

The Isoflex system renders possible the insulation of main lengths from one another and incorporates, for this purpose, an insulating ring between the two coupling collars. The bolts are passed through bakelite bushes.

The Metastandard system is employed in connexion with slip joints, tightness and flexibility being secured by means of a rubber gasket protected on either side against shear by machined bakelite guard rings.

THE USE OF GAS FOR SPACE HEATING.

Three Papers were presented on the subject of space heating by gas. G. Richard dealt with the practical aspects of forced hot-air circulation and P. Richalet with automatic regulation and safety devices. The subject of automatic regulation was also treated by H. Prim.

In the first Paper, details were given of the principles involved in the design of installations in which gas is used for the heating of air, the matters discussed including the calculation of the size of the installation, the influence of furniture and furnishings, the distribution of the hot air in installations in schools, conference rooms, cinemas, churches and factories, the question of air-admission ports, and the calculation and construction of ducts. Consideration was also given to acceptance tests for the completed installation.

In connexion with the automatic regulation of forced-air heating systems, P. Richalet described the use of thermostatic equipment for the control of the system in relation to variations in atmospheric temperature and to the temperature to which the air is to be heated. Safety devices were considered under the headings: failure of the gas supply, stoppage of the fan and prevention of explosions during the lighting up of the installation. Reference was made to the specialities of a number of firms.

An example was given of the layout of a control panel for an installation of four hot-air generators having a total capacity of 680,000 B.Th.U. per hour.

H. Prim, in his Paper, laid great stress on the economies effected by thermostatic and clock control and referred to the question of time lag both in the initial period of heating up and in the response of the system to variations of atmospheric temperature. The relative merits of control in terms of the external or internal temperature were discussed in this connexion. In some instances, the control system may take care of both of these variables. Control in relation to the internal temperature is suitable in installations in which the heating system is of high capacity—*e.g.*, in schools or churches. It is not always easy to choose a suitable location for the thermostat. The difficulty may, however, be overcome by the installation of a small external insulated chamber containing an electrical resistance and simulating, on a small scale, the behaviour of the main building. In cases in which occupation of the premises extends over a daily period of several hours and large areas of walls have to be heated, control in terms of the external temperature is preferable.

The three Papers contained numerous illustrations and diagrams.

REPORTS OF COMMITTEES.

Manufacture.—The Committee on Manufacture has been engaged in an analysis of the replies to a questionnaire on the subject of producers, and hopes, in due course, to publish a study on the relative merits of built-in and external producers and on the operation of producers.

Distribution.—Further work on the extended behaviour of rubber gaskets has been carried out. The preliminary examination of a series of gaskets installed in a number of distribution systems in 1933 was made in 1935, a number of samples having been withdrawn in 1935 after the gaskets had been in use for 18 to 20 months. ("JOURNAL," 1936, **217**, 273.) Further specimens were withdrawn for examination in 1937 and were submitted to a number of physical and chemical tests. Of the three different grades of rubber, one continues to behave normally, one shows more wear due to the particularly aggressive nature of the gas in question, and the third behaved abnormally in the interval between the two sampling periods. It is concluded that the best method for the protection of rubber gaskets is the use of lead packing.

Preliminary work on asbestos gaskets indicates good performance over a period of eighteen months.

A new edition of the gas-fitters' manual is in course of preparation.

Tar, Benzole, and By-Products.—The report is devoted to a *résumé* of the methods of coke-handling adopted by seventy-five undertakings which responded to a request for information in the form of a questionnaire. Continuous vertical retorts are in use in 21 of the works, intermittent vertical retorts or chambers in 22 works and horizontal retorts in 30 works, while, in 2 works, more than one type of plant is employed. Consideration is given to coke quenching and to coke-handling prior to grading. A further report will be devoted to coke-grading and storage.

The concerns under review range from large undertakings (3) producing upwards of 250 tons of coke per day to small undertakings (22) having a daily coke production below 15 tons.

As regards the dryness of the coke, it is stated that the coke leaving continuous vertical retorts contains 1-3% of moisture, though in works in which supplementary water-quenching is employed the figure may reach 7-10%.

In the case of installations of intermittent chambers or retorts, the moisture content is generally 8-15%, though where the coke is passed through a cooling flue after leaving the quenching tower, in which a limited quantity of water is employed, a moisture content as low as 3% is achieved.

The horizontal retort coke contains 7-18% of moisture in the larger sizes, as much as 25% of moisture being sometimes present in the fines.

In a number of works, attempts have been made to substitute special metals for mild steel in the construction of parts of the coke-handling plant subjected to abrasion. For the frames of coke cars, a hard copper-bearing steel (semi-rustless steel) has given good service, though it offered no advantage in the buckets of elevators.

Manganese steel containing 10-12% of manganese gives the best results, but the increased wear does not compensate for the extra cost and the metal is difficult to work.

Semi-hard or hard steel is more resistant than is mild steel to the abrasive action of coke and costs but little more.

Cast-iron is more resistant to abrasion and corrosion by coke than is steel, and, where machining is unnecessary, white cast-iron is superior to the grey variety. Cast-iron may be used, *inter alia*, for wearing plates.

A heat-hardening nickel-chromium cast-iron may, with advantage, be substituted for ordinary cast-iron, especially for parts which have to be specially hard. Depending on the thickness of the casting, the composition may be varied as follows:

Thickness.	Total Carbon.	Mn.	S.	Si.	Ni.	Cr.
	%	%	%	%	%	%
1–3 in. ..	3·1–3·4	0·6–0·9	Below 0·12	1·75–2·2	1·25–1·5	0·5–0·6
Above 3 in...	3·1–3·4	0·6–0·9	„ 0·12	1·25–1·5	2·0–2·5	0·75–0·9

Propaganda.—An enquiry having been made as to current practice in the construction of the flue systems of gas-heating installations, information is presented as to steps which were taken in certain instances to deal with excessive condensation, down draught, &c. Where such difficulties arise, a solution is always possible.

Among new appliances deserving of the notice of the Industry may be mentioned a plate-washing machine (Compagnie Hobart), a gas-heated iron (Société Industrielle des Compteurs), an automatic regulating and safety device for gas-heating equipment (Société Française de l'Anémostat) and a central-heating boiler (M. Savary).

The plate-washing machine is capable of washing and rinsing 650-1,000 plates per hour with a gas consumption of 160-175 cu.ft., a power consumption of 1 kWh and a water consumption of 35 gallons. The washing water, contained in a 15-gallon tank, is heated to a temperature of 60-65° C. by a gaseous immersion heater, the waste gas from which heats the rinsing water, which flows through a bank of tubes, to a temperature of 70-90° C.

Having served its purpose, the rinsing water passes, by way of an overflow, to the wash-water tank.

The dirty plates are fed to the machine on racks and are subjected to a spray of hot water by the agency of a motor-driven circulator, the jets being mounted on a shaft which rotates under the influence of the issuing water. The same means serves to rotate the two shafts carrying the rinsing-water jets.

The gas iron has an independent heater on which the iron is placed endwise; heating is internal. Two irons are provided so that one may be in use while the other is being reheated.

The automatic regulating device for heating systems includes a cam-operated, clock-controlled mechanism whereby the heat input can be varied in accordance with a predetermined time schedule.

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The Main Times
SPECIAL COOKER EDITION
LONDON, JANUARY, 1939
GOOD NEWS FOR SALES STAFFS
SPECIAL!
Fresh Cooker Pro
for the New S
R. & A. MAIN, LTD. have pleasure in
Gas interests this advance broadsheet
gramme of new Cookers for the 1939 seas
it will be seen that completely new mo
different price classes.
With unabated enthusiasm, undaun
difficulties that beset those who "pioneer" in gas-stoves, they
have applied themselves to the task of creating and perfecting
the cookers specified below, viz., the No. 57 "Cabinet"
High-Grade type and the No. 527 "Streamlined"
intermediate type.
These models, it is confidently believed, will carry on the
MAIN tradition by proving to be "the best of their time."
They will be worthy successors, each in its own class to
Main Cookers which, with every succeed
have continued to take the
and appr
The No. 57 Cooker, fitted with Chromium Single Plate Rack and Chromium Legs.
THE MAIN TIMES, JANUARY, 1939
The Nos. 57 and 527 Cookers Pictured in Kitchen Settings
The No. 527 Intermediate Cooker, fitted with Chromium Single Plate Rack.
The No. 57 High-Grade Cooker, showing its Hinged Cover closed
The No. 57 Main Coo
A HIGH-GRA
THIS is an entirely new production
with many exclusive features. It
is of the "high-grade" price category
and is classed as a "cabinet" cooker.
EXTERNAL APPEARANCE.
So far as contour goes it is also as much a
"streamlined" Cooker as any yet extant.
There is no projection of the hotplate, and
no break of contour anywhere except for the
door handle and in a minor degree the tap
handles and thermostat head. In a novel and
practical design these last are all mounted
on a facia plate which covers the front of
the hotplate completely except for the
opening left for the aperture of the grill pan.
No door hinges are visible and the door itself
is so arranged that, when closed, it com-
pletely covers the width and does not
project beyond the front line of the oven.
CONSTRUCTION AND MATERIALS.
The foundation of the Cooker is a cast-
iron base-plate to which the Cooker is
secured.
The hotplate top consists of two cast-iron
sections supported within a narrow contour
of cast-iron. Other cast iron parts are the
bottom fire-box, the upper fire-box, the
burners and small hotplate parts.
The "legs" consist alternatively of bent
chromium plated steel pipes in shape like
the runners of a toboggan—two to each
Cooker, or of four cast-iron feet.
Both types of "legs" are fitted with
levelling screws to accommodate the Cooker
to an uneven floor.
All the outer sides, which extend from the
base-plate to the hotplate edge, the door and
the facia plate are white enamelled Arca-
bond metal, as is the hotplate cover-plate.
All necessary cast-iron parts are
enamelled.
FE.
BOILIN
THE GRILI
A useful Main Extra" for the New Cookers
The "P.R." HOT-CLOSE enables plates or other dishes to be warmed without interfering with the cooking of food on the hotplate or in the oven. It is strongly constructed, and is heated by a luminous burner of very small consumption.
The interior is fitted
In order to present you with advance details of the new Main Cookers, a special news-sheet, "The Main Times" has just been distributed. It contains comprehensive descriptions of the No. 57 "Cabinet" model, and the No. 527 "Streamlined" model. Both Cookers are fully illustrated.
HAVE YOU HAD YOUR COPY? If not, write now as there are not many left.
MAIN
R. & A. MAIN LIMITED, LONDON AND FALKIRK
Local Office & Showrooms: 48 Grosvenor Gardens, S.W.1. Glasgow Office & Showrooms: 82 Gordon Street

Scottish Juniors Visit Manchester

A party of 150 Scottish gas men—comprising members of both Districts of the Scottish Junior Gas Association and also of the Western District Salesmen's Circle—visited Manchester on Saturday, Jan. 14, as guests of Maxol Heaters, Ltd.

During the forenoon they were conducted over the works and shown the various stages in the production of Maxol water heaters. A visit was also paid to the Manchester Corporation Gas Showrooms, where the visitors were welcomed by Mr. J. H. Cadman, Commercial Manager of the Gas Department.

The afternoon was spent at the Manchester United *v.* Grimsby Town Football Match.

After tea, Mr. Lomax, Director of Maxol Heaters, Ltd., who presided, welcomed the visitors and expressed the hope that they had enjoyed their visit to Manchester. Mr. N. C. Sturrock (President of the Western District and Secretary of the Western District Sales Circle) expressed thanks to Mr. Lomax for the arrangements which had been made for the visit and assured him that the members had found it most instructive. Mr. R. Cowie (President of the Eastern District) expressed thanks on behalf of his Association and also proposed a vote of thanks to the members of Messrs. Maxol's staff who had conducted the parties round the works.

Mr. Lomax then introduced Mr. G. M. Atkinson.

THE POSSIBILITIES OF SINK WATER HEATERS.

By G. M. Atkinson, of Burnley.

Being a salesman, I propose addressing you from the salesman's point of view. Although we of the sales side are much more in the eye of the public (sometimes to our regret) than the production side, it is vitally essential that the two departments, together with the distribution department, of course, are linked together with complete co-operation and understanding which is necessary to a successful undertaking.

I propose to introduce a few remarks on the opportunities the sink type water heater offers the salesman to increase his sales, and, we hope, the gas consumption.

One must not lose sight of the more or less conventional way of obtaining small quantities of hot water by the use of the kettle—from a consumption point of view we welcome such a method—but one might also welcome the return of the 1914 gas cooker, again only for consumption. But time marches on, and the Gas Industry rightly prides itself upon its progressiveness. Credit must be given, of course, to the manufacturers of appliances for their efforts. But in these modern days of speed and efficiency one immediately thinks of instantaneous service. The husband, wife, children, and maid simply have not the time to wait. If one enters a café for a snack, and an hour's rest, how annoying it is to have to wait a few minutes; so the salesman should consider every avenue where instantaneous service is essential.

Therefore, we must offer facilities for obtaining warm, hot, or boiling water instantaneously and economically, and the only method is gas. The hot water question is always an important one, and I do not think that the general public have yet been sufficiently educated to the fact that hot water is no longer a luxury, but a definite necessity. Therefore, it is the salesman's duty to convince every gas consumer and every non-gas consumer within their area of supply that their essential need is a gas water heater.

A census of the households not yet equipped with a modern gas water heater would be most illuminating. With such an excellent variety of gas water heaters now available, especially the various types you have seen in course of production to-day, the choice of heater can be adopted to comply with almost any local conditions of gas and water supply, the economic position of the consumers, and the habits and customs of the people.

One hears remarks concerning "saturation point" of appliances; as a salesman I ridicule the possibilities of saturation. In my mind it is a weak excuse for depleted sales returns. The sooner salesmen forget the word "saturation" the better for their own confidence and abilities. With initiative and complete confidence in the appliance you are offering the customer, new fields are always there to explore, and what greater opportunity can one have of increasing that confidence in the appliance than by "studying" the actual production such as you have witnessed to-day. One must realize the only contact the manufacturers have with the general public is through the medium of your own undertaking. Therefore, the confidence you have gained by your own observations reinforced by the integrity of the producers leaves no doubt that you are offering "the goods."

The first essential objects are for the salesman to explore every avenue, to ascertain the methods of obtaining hot water, the purposes for which hot water is needed, the quantity required, and its temperature. I do not forget that hot water can be obtained by coal, oil, or electricity; but I do not consider them serious competitors. The only practical means of heating water by these methods is by storage, and each one can be considered somewhat wasteful and slow, and incomparable with the modern instantaneous water heaters. One might suggest where electricity is installed for such purposes the salesman can certainly assure himself that he has found another prospect for a gas water heater at some future date, unless, of course, the user is an electrical-fanatic who will not allow himself to admit he is not benefiting.

One has frequently heard the remark "We cannot sell this or that appliance in our town." As the sergeant-major would tell us, "there ain't no such thing as carn't." With sufficient advertising, forceful and convincing statements, practical demonstrations, and a little persistence, the salesman may make an impossibility an accomplished fact.

I feel sure you will agree from your observations that simplicity in design with high efficiency is the main object in the construction of the "Maxol" heaters. The more simple the heater, the less maintenance required after installation, and to this end in the whole range of heaters you have seen to-day, the principle in design, and the methods of construction all lead to one essential—a serviceable appliance.

Supporting the Home Market.

Another very important factor which is most gratifying—I understand the materials used in manufacturing and constructing the heaters and boilers are definitely British, although the cost must be much higher than foreign material. In the opinion of the makers, by purchasing British material the home market is receiving the support it needs, and to which it is rightly due. Therefore, the slogan "British Made" is honestly justified by the use of British materials. During my tour I noticed in all heaters the maximum strength of copper sheet, &c., is introduced; therefore resulting in long life and high efficiency.

Interesting myself in the construction of the Maxol automatic heater, I noticed the design is on the same principle as all the other products—simplicity—but with a maximum efficiency, the standard of workmanship and materials both being of a very high order. Following my enquiry, I learned 500 operations were necessary to produce the completed automatic heater, which you will agree is most illuminating. Another interesting feature—the valve is so produced to reduce replacements to a minimum, and adjustments can be carried out without the studying of complicated instructions, which definitely helps the fitter or maintenance man.

One may often find the water supply inadequate for the automatic type; therefore, we have found the principle of the interlocking taps a solution to the difficulty.

Before concluding, I would like to mention one or two facts regarding our experience of the Maxol water heater in Burnley from August, 1934, to December, 1938. We have sold and fixed approximately 6,000 Maxol heaters. When one considers the uncertainty of the main industries, coal and cotton, during the last few years I think you will agree it is good going. The maintenance cost of the Maxol heaters installed is infinitesimal. It may interest you to know that Maxol Heaters, Ltd., have just completed a survey and maintenance tour which included the heaters fitted from August, 1934, to December, 1937 (approximately 4,500 heaters), and the actual cost of replacements averaged ¼d. per heater. The cost of the whole survey, including replacements, works out at an average cost of approximately 2s. 6¼d. per heater.

Mr. STURROCK called for a vote of thanks to Mr. Atkinson for his Paper, to Mr. Cunliffe, of Maxol Heaters, Ltd., for the arrangements which he had made for the party, and also to the Chairman.

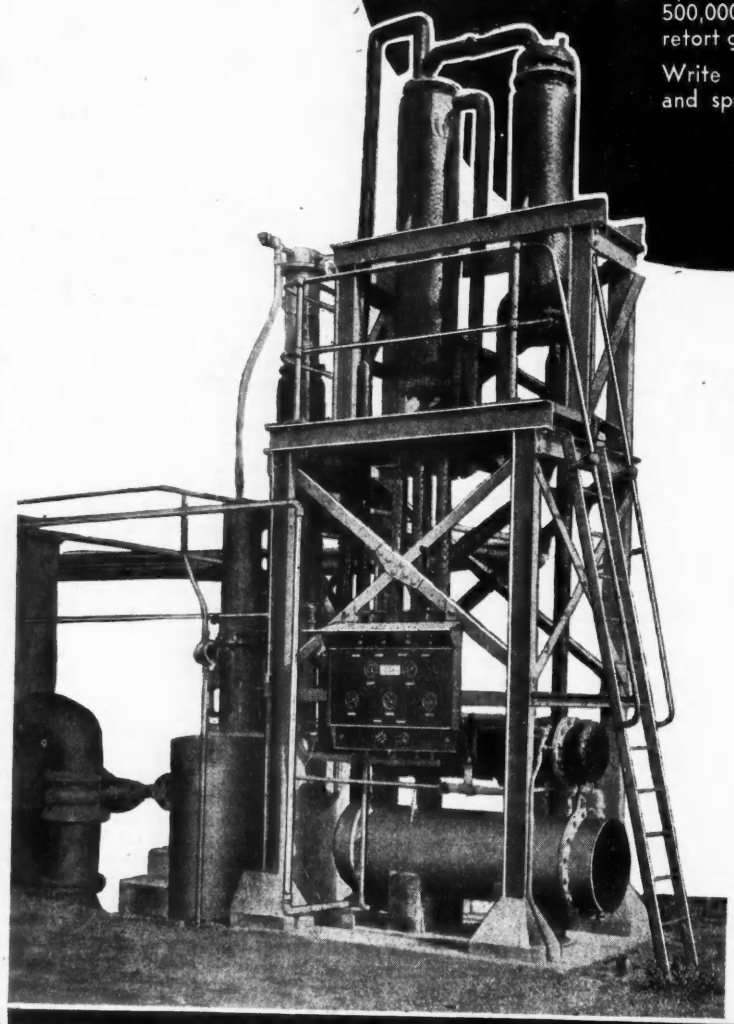
The evening was spent in a visit to the Circus at Belle Vue Gardens, and this brought to a close a visit which had proved itself to be both instructive and entertaining.

BENZOLE PLANT

We are specialists in the design and manufacture of Benzole Recovery Plants of all sizes, our largest installation to date having a capacity of 16 million cu.ft. per diem.

The plant illustrated is a typical example of one of our smaller installations. This is installed at Hawick Gas Works for the recovery of two gallons of benzole per ton of coal from 500,000 cu.ft. of vertical retort gas per diem.

Write for full particulars and specifications.



NEWTON, CHAMBERS & CO. LTD.
THORNCLIFFE IRONWORKS NR. SHEFFIELD

Markets and Manufactures

Current Sales of Gas Products

The London Market

Jan. 30.

Value of Tar Products are steady at the following levels:

Pitch, nominal, at about 30s. per ton f.o.b.
Creosote, about 3¼d.
Refined tar, 3¾d.
Pure toluole, about 2s. 3d.
Pure benzole, about 1s. 9d.
95/160 solvent naphtha, 1s. 7d. to 1s. 8d.
90/160 pyridine, 10s.
All per gallon naked at makers' works.

The Provinces

Jan. 30.

Crude Gas-Works Tar, 12s. 9d. to 17s. 9d.*

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 29s. to 30s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 29s. to 30s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 4⅛d. to 4⅜d.; low gravity, 4⅛d. to 4¼d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4¼d. to 4¾d. per minimum 40% purely nominal; "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4⅞d; filtered anthracene oil, min. gr. 1,080, 5⅛d. to 5¾d.; heavy tar oil, gr. less than 1.080, 4½d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *Jan.* 28.

Market conditions continue dull, but makers' prices show no alteration of any importance.

Crude gas-works tar.—Actual value is about 34s. to 35s. per ton *ex* works in bulk.

Pitch of vertical quality is available at 21s. to 22s. per ton f.o.b. for export and round 20s. per ton *ex* works in bulk for home trade.

Refined tar.—Home prices are fixed at 3¾d. to 4d. per gallon, while export supplies can be secured at round 2¾d. to 3d. per gallon, both into buyers' packages at makers' works.

Creosote oil.—Quotations would appear to be more stable as follows: Specification oil, 3¾d. to 4d. per gallon; low gravity, 4⅛d. to 4¾d. per gallon; neutral oil, 3¾d. to 4¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—Orders are infinitesimal and supplies can be secured as under: Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; and pale, 99/100%, 1s. 4d. to 1s. 7d. per gallon; all according to quality *ex* works in buyers' packages.

Crude naphtha is available at 5½d. to 6d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 3½d. to 1s. 4d. per gallon and 90/190 heavy naphtha is round 1s. 1d. to 1s. 1½d. per gallon.

Motor benzole is 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—90/160 grade is 8s. 6d. to 9s. 6d. per gallon and 90/140 grade is 9s. 6d. to 10s. 6d. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole..	0 9⅛	to	0 10	per gall. at works
Motor „ ..	1 3	„	1 3⅛	„ „ „
90% „ ..	1 4	„	1 4⅛	„ „ „
Pure „ ..	1 8	„	1 8⅛	„ „ „

Contracts Advertised To-Day

Crude Naphtha.
Lincoln Gas Department. [p. 318.]

Gas Oil.
Blackpool Gas Department. [p. 318.]

Pipes and Specials.
Blackpool Gas Department. [p. 318.]
Dewsbury Gas Department. [p. 318.]

Spent Oxide.
Carlisle Gas Department. [p. 318.]

Stores, &c.
Carlisle Gas Department. [p. 318.]

Sulphuric Acid.
Carlisle Gas Department. [p. 318.]

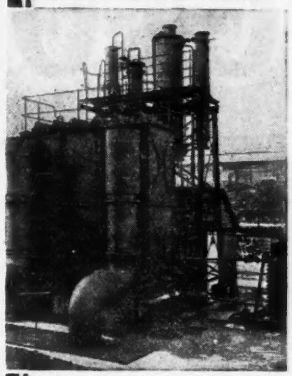
Dividend Announcement

Newcastle and Gateshead.—The Directors of the Newcastle and Gateshead Gas Company at their meeting resolved to recommend to the proprietors, subject to audit, the payment on Feb. 28 of final dividends for the year ended Dec. 13, 1938, as follows: £2%, less income-tax, upon the preference stock, making 4% for the year; £2 17s. 6d.%, less income-tax, upon ordinary stock, making £5 7s. 6d.% for the year.

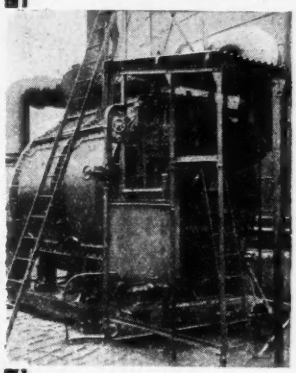
Coalville Gas Department

The net loss on the Coalville Gas Department during the year ended March 31 last, according to the recently-issued abstract of accounts, was £566 as compared with the previous year's net loss of £124. Considerable extensions are having to be made, but the gas loan will have been discharged by 1941, and it is anticipated that the financial position of the works will then improve considerably.

These are "Permac" metal-to-metal Joints



"Permac" Joints in a Gas Works.



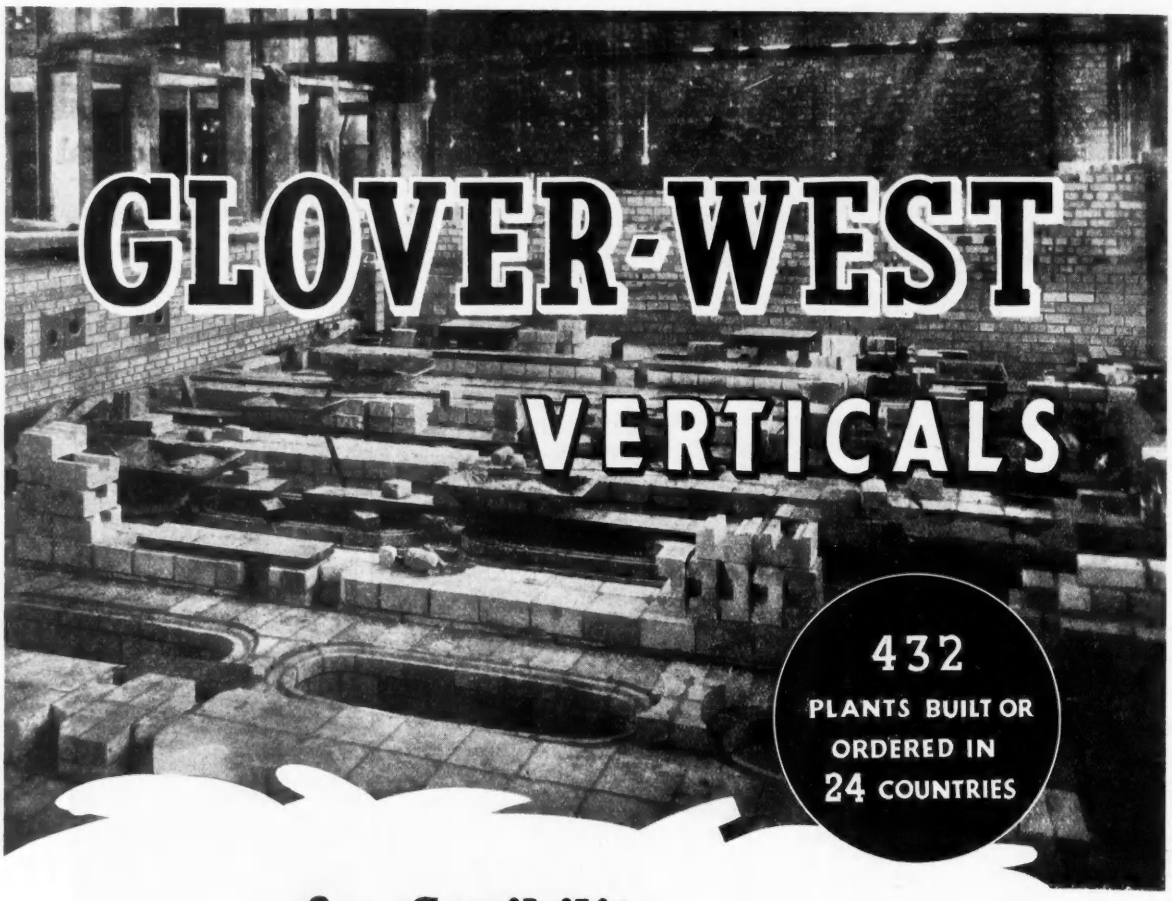
"Permac" Joints in a Gas Works.

Wouldn't it pay you to use it?

Ever since 1913 "PERMAC," the original Metal-to-Metal Jointing, has been holding up difficult joints like these in important Gas Works and on Coke Oven Plants all over the world. Equally suitable for any joint—steam, water, gas, oil—screw pipe or flange. Send for particulars.

Permac
METAL-TO-METAL JOINTING MATERIAL

Sole manufacturers:—
THOMAS & BISHOP LTD
37, Tabernacle St.
LONDON, E.C. 2
Telephone: Clerkenwell 3351 (2 lines)



. . . for flexibility

Plants recently started up have shown again the great flexibility of Glover-West verticals.

A sudden rise or fall in the load creates no difficulties in the retort house. The rate of production can be changed readily over a wide range.

THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

WEST'S
CARBONIZING PLANTS

GLOVER-WEST VERTICAL RETORTS ● WESTVERTICAL CARBONIZING CHAMBERS

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER: Albion Ironworks, Miles Platting — 'Phone: COLLYHURST 2961 : 'Grams: "STOKER, MANCHESTER"

LONDON: Columbia House, Aldwych, W.C.2 — 'Phone: HOLBORN 4108 : 'Grams: "WESGASCO, ESTRAND, LONDON"

GAS STOCKS AND SHARES

Widespread selling was the dominating feature on the Stock Exchange last week. It is true that the bulk of this came from abroad, but the movement also spread at one time to investors at home. It was not until after Sir Samuel Hoare's speech that the liquidation eased up and markets displayed a firmer tendency. Gilt-edged stocks were particularly weak and, although hardening towards the close, many depreciated over a point on the week. Home rails fared even worse, and some of the fixed-interest stocks finished from 5 to 6 points lower. Industrial shares continued their downward trend, though a few of the leaders recovered a few points on Friday. Rubber and oil shares were also depressed, but in the majority of cases losses were fractional only.

Conditions in the Gas market were much the same as in the previous week. The volume of business was a little less and in sympathy with the general trend the few price changes were downwards. Several Gas Light stocks weakened, the units falling a further 9d. to 20s. 9d. The foreign situation has been too much for Imperial Continental. A few weeks ago this stock rose to 127, but it has now dropped back to 112½, losing 8 points last week. A fall of 4 points to 92½ occurred in South Suburban 3¼% debenture stock. Prices on the Provincial Exchanges and in the Supplementary List closed unchanged.

The ordinary dividend announcements for the past half-year made during the week include the following: Gas Light and Coke £2 16s.%, again making £5 12s.% for the year, and doubtless the extra cost of coal has been largely responsible for the reduction in the carry forward from £102,376 to £53,598. South Metropolitan 3%, making 5½% for the year (the same), the balance available for ordinary dividend increasing from £214,747 to £218,242. Watford and St. Albans £3 8s. 9d.%, making £6 17s. 6d. for the year, and comparing with 7% for 1937—a small increase in the price of gas necessitating a reduction in the dividend under the Company's sliding scale provisions. The net profit for the year amounts to £94,747, against £92,330. The Romford Gas Company is distributing 4% again, making 8% for the year, and Chester 3¼% making 5¼% (the same).

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 27.	Rise or Fall on Week.
1,767,439	Sept. 5	8	8	Alliance & Dublin Ord. ...	130—140	...
374,000	Dec. 19	4	4	Do. 4 p.c. Deb. ...	93—98	...
734,733	Nov. 7	5	5	Asscd. Gas & Water U'd'ts Ord.	17/——19/–	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/——21/–	...
444,389	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	19/——21/–	...
296,523	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/——18/–	...
500,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	93—98	...
560,070	Aug. 22	7	7	Barnet Ord. 7 p.c.	158—162	...
300,000	Oct. 10	1/9½	1/4½	Bombay, Ltd.	23/——25/–	...
180,435	Aug. 22	9½	9½	Bournemouth sliding scale ...	195—205	...
640,407	,,	7	7	Do. 7 p.c. max. ...	157—162	...
495,960	,,	6	6	Do. 6 p.c. Pref. ...	130—135	...
50,000	Dec. 19	3	3	Do. 3 p.c. Deb. ...	75—80	...
312,025	,,	4	4	Do. 4 p.c. Deb. ...	96—101	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
357,900	Aug. 8	7½	7½	Brighton, &c., 6 p.c. Con. ...	142—147	...
659,955	,,	6½	6½	Do. 5 p.c. Con. ...	126—131	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	127—132	...
855,000	Sept. 19	8	7	British Ord.	132—137	...
100,000	Dec. 19	7	7	Do. 7 p.c. Pref.	138—143	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	112—117	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
100,000	22 May '33	6	4	Cape Town, Ltd.	1—2	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref. ...	1—2	...
150,000	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	60—70	...
626,860	July 18	6	6	Cardiff Con. Ord.	118—123	...
237,860	Dec. 19	5	5	Do. 5 p.c. Red. Deb. ...	103—108	...
98,936	Sept. 19	2/–	2/–	Colombo Ord.	1⅛—1⅛	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	22/6—24/6	...
739,453	Oct. 10	–/11·48	–/11·48	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/6—25/6	...
1,775,005	Jan. 23	5	4	Commercial Ord.	73—78*	–2
140,000	,,	—	§13/4	Do. 4 p.c. Red. Pref. ...	95—100	...
620,000	Dec. 5	3	3	Do. 3 p.c. Deb. ...	70—75	–1
286,344	Aug. 22	5	5	Do. 5 p.c. Deb. ...	113—118	...
200,000	,,	—	§30/2	Do. 3½ p.c. Red. Deb. ...	97—102	...
807,560	Aug. 8	7	7	Croydon sliding scale ...	135—140	...
644,590	,,	5	5	Do. max. div.	100—105	...
620,385	Dec. 19	5	5	Do. 5 p.c. Deb. ...	112—117	...
239,000	Aug. 8	5	5	East Hull Ord. 5 p.c. ...	95—100	...
186,155	Aug. 8	6	6	East Surrey Ord. 5 p.c. ...	116—121	...
176,211	Dec. 5	5	5	Do. 5 p.c. Deb...	112—117	...
250,000	Nov. 7	8	4	Gas Consolidation Ord. 'B' ...	19/——21/–	...
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	17/6—19/6	...
9,223,324	Aug. 8	5⅓	5⅓	Gas Light & Coke Ord. ...	20/3—21/3a	––/9
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	73—78	–1
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	95—100	–1
2,993,000	Jan. 9	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	95—99	–¼
8,602,497	Nov. 21	3	3	Do. 3 p.c. Con. Deb....	72—77	–2
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	109—113	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	107—111	...
700,000	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	–3
270,466	Aug. 22	6	6	Harrogate New Cons. ...	117—122	...
157,500	Mar. 21	1/2⅔	‡1/–	Hong Kong and China Ord. ...	⅞—⅞	...
213,200	Aug. 8	6	5⅜	Hornsey Con. 3½ p.c.... ...	97—102	...
5,600,000	Oct. 24	12	8	Imperial Continental Cap. ...	110—115	–8
172,810	Jan. 23	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—101*	–1
235,242	Aug. 8	8½	8½	Lea Bridge 5 p.c. Ord. ...	160—165	...
63,480	Dec. 19	3	3	Maidstone 3 p.c. Deb. ...	69—74	...
45,000	Nov. 21	†10	†10	Malta & Mediterranean Metropolitan (of Melbourne) ...	130—135	...
392,000	Oct. 3	5½	5½	5½ p.c. Red. Deb.	100—105	...
231,977	Aug. 22	5	5	M.S. Utility 'C' Cons. ...	99—104	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref. ...	93—98	–2
390,076	Dec. 19	4	4	M.S. Utility 4 p.c. Deb. ...	95—100	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	112—117	...
125,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Bds.	94—97	...
675,000	Nov. 21	†6	†6	Montevideo, Ltd.	70—75	...
250,000	Aug. 8	7½	7½	North Middlesex 6 p.c. Con.	142—147	...
396,160	Aug. 8	5	5	Northampton 5 p.c. max. ...	105—110	...
300,000	Oct. 24	†7	†9	Oriental, Ltd.	145—150	...
468,537	Dec. 5	8	7½	Plymouth & Stonehouse 5 p.c.	130—140	...
621,667	Aug. 8	8½	8½	Portsmouth & Gosport Cons.	157—162	...
241,446	,,	5	5	Do. 5 p.c. max. ...	100—105	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	90—95	...
114,000	Aug. 8	5	5	Preston 5 p.c. Pref.	105—110	...
247,966	Dec. 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	96—101	...
625,959	Jan. 9	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Sept. 5	6	6	San Paulo 6 p.c. Cum. Pref. ...	8½—9	...
441,275	Sept. 19	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	20/6—22/6	...
460,810	Sept. 19	–/10½	–/10½	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Aug. 22	5	8½	Shrewsbury 5 p.c. Ord. ...	143—148	...
9,000	June 3	4	‡4	South African Ord.	4½—5½	...
1,371,752	Aug. 22	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	21/——23/–	...
871 636	,,	–/10½	–/10½	Do. 4½ p.c. Red. Cum. Pref.	19/——21/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	17/——19/–	––/6
450,000	Aug. 8	4	4	Do. 4 p.c. Deb.	99—102	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—97	...
6,709,895	Aug. 8	6	5	South Met. Ord.	102½—105½	–½
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	128—133	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	93—98*	–2
1,895,445	Dec. 19	3	3	Do. 3 p.c. Deb.	74—79	...
1,000,000	Jan. 9	5	5	Do. 5 p.c. Red. Deb. ...	108—111	...
600,000	,,	§31/–	3⅜	Do. 3⅜ p.c. Red. Deb. ...	98—101	...
1,543,795	Jan. 23	6	6	South Suburban Ord. 5 p.c. ...	111—116*	–2
512,825	,,	5	5	Do. 5 p.c. Pref.	108—111*	–1
500,000	,,	4	4	Do. 4 p.c. Pref.	93—98*	–2
250,000	,,	3⅜	3⅜	Do. 3⅜ p.c. Red. Pref. ...	91—96*	–1
888,587	Dec. 5	5	5	Do. 5 p.c. Deb.	113—118	...
250,000	,,	4	4	Do. 4 p.c. Deb.	95—100	...
200,000	Aug. 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	–4
427,859	Sept. 19	8½	9½	S. Western Gas & Water Ord.	16/——18/–	...
160,523	Oct. 10	–/10½	–/10½	Do. 4½ p.c. Red. Cum. Pf.	19/——21/–	...
110,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	93—98	...
750,541	Aug. 8	5½	5	Southampton Ord. 5 p.c. ...	105—110	...
148,836	Dec. 19	4	4	Do. 4 p.c. Deb.	93—98	...
350,000	Aug. 8	5½	5½	Swansea 5½ p.c. Red. Pref. ...	105—110	...
200,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97	...
1,076,490	Aug. 8	6½	6½	Tottenham and District Ord.	127—132	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref.	116—121	...
62,235	,,	5	5	Do. 5 p.c. Pref.	108—113	...
334,615	Dec. 5	4	4	Do. 4 p.c. Deb.	95—100	...
85,701	Jan. 9	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100*	...
1,131,550	Aug. 22	6	4	U. Kingdom Gas Cor. Ord. ...	18/——19/–	––/3
1,051,280	Nov. 7	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/——21/–	...
762,241	,,	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	19/——21/–	...
745,263	Dec. 19	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	15/6—17/6	...
1,066,186	Sept. 5	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
375,689	Aug. 8	7	7	Uxbridge, &c., 5 p.c.	125—130	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Jan. 23	7	7	Wandsworth Consolidated ...	132—137*	–3
2,525,768	,,	4	4	Do. 4 p.c. Pref.	93—98*	–2
1,343,964	Dec. 19	5	5	Do. 5 p.c. Deb. ...	113—118	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	95—100	...
400,000	,,	§25/–	3⅜	Do. 3⅜ p.c. Red. Deb. ...	96—101	...
558,342	Aug. 8	7	6⅔	Watford and St. Albans Ord.	128—133	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	107—112	...
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	113—118	...
200,000	,,	—	16/8§	Do. 4 p.c. Red. Pref. ...	95—100	...
200,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
200,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—97	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Jan. 27.	Rise or Fall on Week.
202,152	Sept. 5	5	5	Ascot Ord.	101—106	...
128,182	Dec. 19	5	5	Do. 5 p.c. Pref.	107—112	...
31,035	Aug. 22	–/4½	–/4½	Associated Utilities 4 p.c. Pref.	16/—18/–	...
100,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
17,000	Aug. 22	8	8	Bognor Orig. Ord. 'A' ...	155—165	...
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	145—155	...
37,440	Aug. 8	10	10	Cam. Univ. & Town 10 p.c. max.	188—198	...
125,970	,,	7	7	Do. 7 p.c. max.	133—138	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	July 18	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Aug. 8	4	4	Croydon 4 p.c. Pref.	97—100	...
130,000	Dec. 19	4	4	Do. 4 p.c. Deb.	95—100	...
65,000	Aug. 8	8½	7½	Eastbourne 'A' 5 p.c. ...	140—145	...
198,000	,,	7	6	Do. 'B' 3½ p.c. ...	114—119	...
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112	...
130,000	Dec. 19	5	5	Do. 5 p.c. Deb.	110—115	...
24,000	Aug. 8	8½	8½	Great Yarmouth 8½ p.c. max.	43—48	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38	...
51,160	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	120—125	...
152,600	Sept. 5	9	8	Guildford Cons.	163—168	...
54,055	,,	5	5	Do. 5 p.c. Pref.	107—112	...
68,250	Dec. 19	5	5	Do. 5 p.c. Deb.	110—115	...
156,600	Aug. 22	7¼	7¼	Hampton Court Cons. ...	126—131	...
80,000	Aug. 8	4	4	Lea Bridge 4 p.c. Pref. ...	90—95	...
60,000	,,	6	6	Do. 6 p.c. Pref.	121—126	...
94,876	Dec. 5	4	4	Do. 4 p.c. Deb.	94—99	...
73,620	Sept. 5	8⅝	8⅝	Luton Cons. 'A'	153—163	...
107,960	Sept. 19	5⅛	4	Mid Kent Ord.	8¼—9¼	...
230,940	Aug. 8	10	10	Oxford & District Ord. ...	195—200	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	107—112	...
126,193	Nov. 7	7½	7½	Peterborough Ord.	137—142	...
64,990	Sept. 5	6½	7½	Redditch Ord.	118—128	...
166,850	Aug. 8	8	8	Romford Ord.	142—147	...
60,000	,,	4	4	Do. 4 p.c. Pref.	99—103	...
44,000	Sept. 19	5	5	Do. 5 p.c. Deb.	112—117	...
25,570	Aug. 8	5½	5½	Rugby 5½ p.c. Pref.	120—125	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	104—109	...
42,750	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	117—122	...
110,950	Aug. 22	8	8	Ryde Ord.	140—150	...
270,086	Sept. 5	7	7	Slough Ord.	128—133	...
21,000	Dec. 19	5	5	Do. 5 p.c. Deb.	108—113	...
28,872	Nov. 7	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	17/—19/–	...
28,866	Sept. 5	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	17/—19/–	...
117,228	Aug. 8	7	5	Swindon Cons.	102—107	...
60,425	Dec. 5	5	5	Do. 5 p.c. Deb.	110—115	...
64,380	Dec. 19	5	5	Torquay & Paignton 5 p.c. Pref.	105—110	...
130,000	Aug. 8	8	5	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	100—105	...
82,000	Jan. 23	6	6	Weymouth Ord.	101—106*	—2
98,384	Aug. 22	6	6	Wolverhampton 6 p.c. Pref.	118—123	...
160,000	Dec. 19	5½	5½	Do. 5½ p.c. Rd. Db.	103—108	...
90,000	Dec. 19	5	5	York 5 p.c. Red. Deb. ...	103—108	...
133,640	July 18	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	118—123	...
120,000	,,	5	5	Do. 5 p.c. Pref.	105—110	...
35,000	Dec. 5	5½	5½	Do. 5½ p.c. Deb.	120—125	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 27.	Rise or Fall on Week.
347,756	July 18	6	5	Bath Cons.	117—119	...
1,667,250	July 18	5	5	Bristol, 5 p.c. max.	112—114	...
120,420	Dec. 19	4	4	Do. 1st 4 p.c. Deb. ...	98—101	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	98—101	...
328,790	,,	5	5	Do. 5 p.c. Deb.	117—120	...
274,000	Aug. 8	5	5	Newport (Mon.) 5 p.c. max. ...	97—99	...
13,200	Sept. 19	8⅔	7	Pontyp'l Gas & W. 10 p.c. 'A'	12¾—13¾	...
13,600	,,	6	5	Do. 7 p.c. 'B' ...	11½—12½	...
40,000	,,	6	5	Do. 7 p.c. 'C' ...	11½—12½	...
140,778	Aug. 8	5	5	Weston-super-Mare Cons. ...	106—108	...
64,338	Dec. 19	4	4	Do. 4 p.c. Deb. ...	98—101	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb. ...	149—152	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 27.	Rise or Fall on Week.
157,150	Aug. 8	6½	5	Chester 5 p.c. Ord.	109—111	...
92,500	Dec. 19	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Aug. 22	6	6	Liverpool 5 p.c. Ord.	122—124	...
245,500	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	100—105	...
306,083	July 18	4	4	Do. 4 p.c. Deb.	100—102	...
106,280	Aug. 8	10	10	Preston 'A' 10 p.c.	198—208	...
188,219	,,	7	7	Do. 'B' 7 p.c.	131—141	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 27.	Rise or Fall on Week.
122,577	Aug. 8	8	8	Blyth 5 p.c. Ord.	160—162	...
732,000	Aug. 22	5	5	Hartlepool G. & W. Cn. & New	87½—88½	...
2,061,315	Aug. 8	5¼	5	Newcastle & Gateshead Con.	22/9—23/3d	...
682,856	,,	4	4	Do. 4 p.c. Pref. ...	100—101	...
776,706	Dec. 19	3½	3½	Do. 3½ p.c. Deb. ...	87½—88½	...
277,285	Oct. 24	5	5	Do. 5 p.c. Deb. '43 ...	103½—105½	...
332,351	Aug. 22	6	6	Sunderland 6 p.c. max. ...	135—137	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 27.	Rise or Fall on Week.
542,270	Aug. 8	9	6	Derby Con.	133—138	...
55,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 19	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 27.	Rise or Fall on Week.
10,000	Aug. 8	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,806,339	Aug. 22	6½	6½	Sheffield Cons.	139—141	...
95,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—102	...

a The quotation is per £1 of Stock.

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